FibeAir® Family

FibeAir™ 1500/1528
FibeAir™ 1500A/1528A
FibeAir™ 1500S/1528S
FibeAir™ 1500P
FibeAir™ 1500AL

With CeraView® Java

High & Ultra High Capacity Wireless Network Systems

Installation and Operation Manual

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April 2005

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Safety Precautions

The following safety precautions should be observed when working with fiber optic lines.

Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.

Do not attempt to adjust the laser drive current.

Do not use broken or unterminated fiber optic cables/connectors or look straight at the laser beam.

ATTENTION: The laser beam is invisible!

The use of optical devices with the equipment will increase eye hazard.

Use of controls, adjustments, or performing procedures other than those specified herein, may result in hazardous radiation exposure.

When working with FibeAir 1500P, note the following risk of electric shock and energy hazard: Diconnecting one power supply disconnects only one power supply module. To isolate the unit completely, disconnect all power supplies.

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Chapter 1
Introduction

FibeAir 1500/1528

FibeAir™ 1500/1528 is a member of the Ceragon Networks® new-generation of Digital Radio Relay Systems (DRRS). FibeAir is a compact, flexible, easy-to-deploy and cost-effective product designed to support high capacity voice, data, and video applications in Wide Area Networks (WANs), and Metropolitan Area Networks (MANs).

FibeAir System

FibeAir systems operate in the 6 to 38 GHz frequency bands and carry medium and high capacity payloads in accordance with ETSI and ITU-T standards, for worldwide operation.

FibeAir provides operators with a wireless-based network solution offering fiber-like quality of service. The system's all digital design provides superior radio performance resulting in an extremely low residual BER, and, consequently, an extremely low cost alternative to metropolitan fiber lines.

FibeAir is designed especially for SDH/SONET and IP based networks, as well as microwave ATM, ensuring safe routing of ATM cells.

As a software-oriented system, FibeAir deploys state-of-the-art digital technology. Together with its integrated SNMP agent, FibeAir can be controlled either by the company's management software or interfaced to the Telecommunication Management Network (TMN) of the service provider.

CeraView™, Ceragon's SNMP-based GUI element manager, and PolyView™, Ceragon's open interface network management software, run on Windows 98/2000/NT and over HP OpenView (Windows or UNIX).

Features

- Compact and easy to install.
- All system setups and configurations are software-determined, including operating frequency channel.
- Internal multiplexer supports most relevant physical interfaces and data rates.
- Forward Error Correction (FEC) coding for improved performance.
- Special optimization for safe ATM transports
- Advanced digital signal processing implementing all-digital adaptive equalization, tracing loops, IF modulation/demodulation.
- High spectral efficiency due to advanced modulation (16/128 QAM).
- 13 external input and output alarms.
- Local display of far-end terminal status.
- Remote software downloads for easy upgrades.
- Loopback control for easy fault isolation.
- In-band management implementation.
- Unique SNMP-based management, with user friendly GUI, operating on Windows or UNIX platforms.
- Protected and non-protected configurations.
- Hitless, errorless diversity protection switching.

Applications

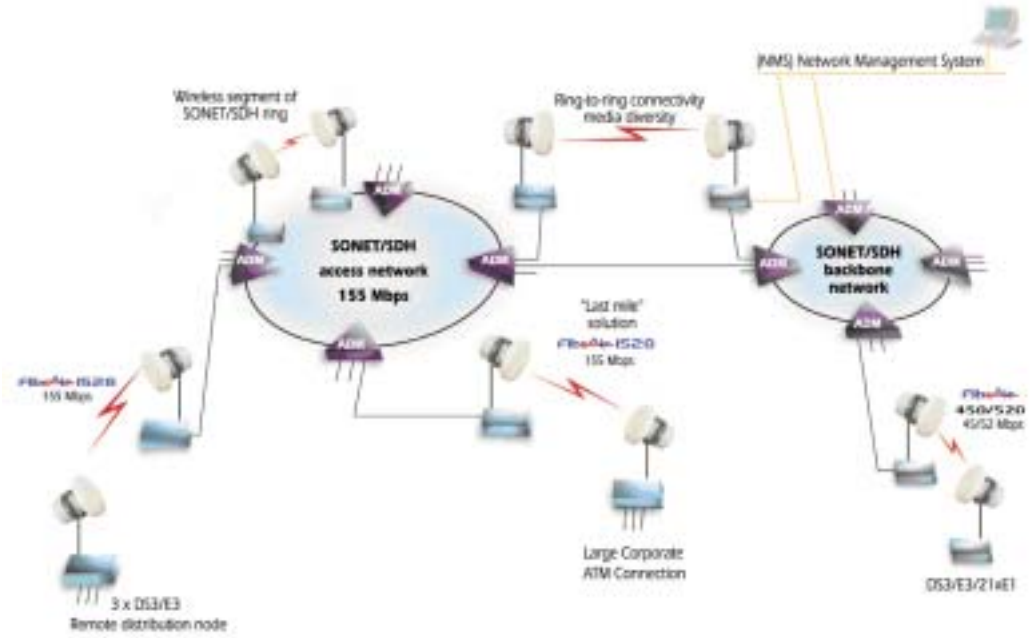
FibeAir 1500/1528 is a natural choice for metropolitan SONET, SDH, ATM, and IP networks. The system is used for ring closures, ring/LAN interconnections and access to remote distribution nodes. The system may be used either as a transparent alternative to fiber lines, or as a redundant link, providing media diversity protection.

FibeAir's low frequency links (6-15 GHz) enable longer operating distances, essential for cellular backbones, ILEC/CLEC backbones, and large enterprises. Together, Ceragon's high and low frequency links provide a comprehensive one-vendor wireless communication solution.

The following are typical FibeAir 1500/1528 applications:

- SONET/SDH Networks
- Cellular Networks - MSC to BSC UPSR Ring
- ATM Networks
- Corporate/Campus Networks
- LMDS Backhaul

SONET/SDH Networks

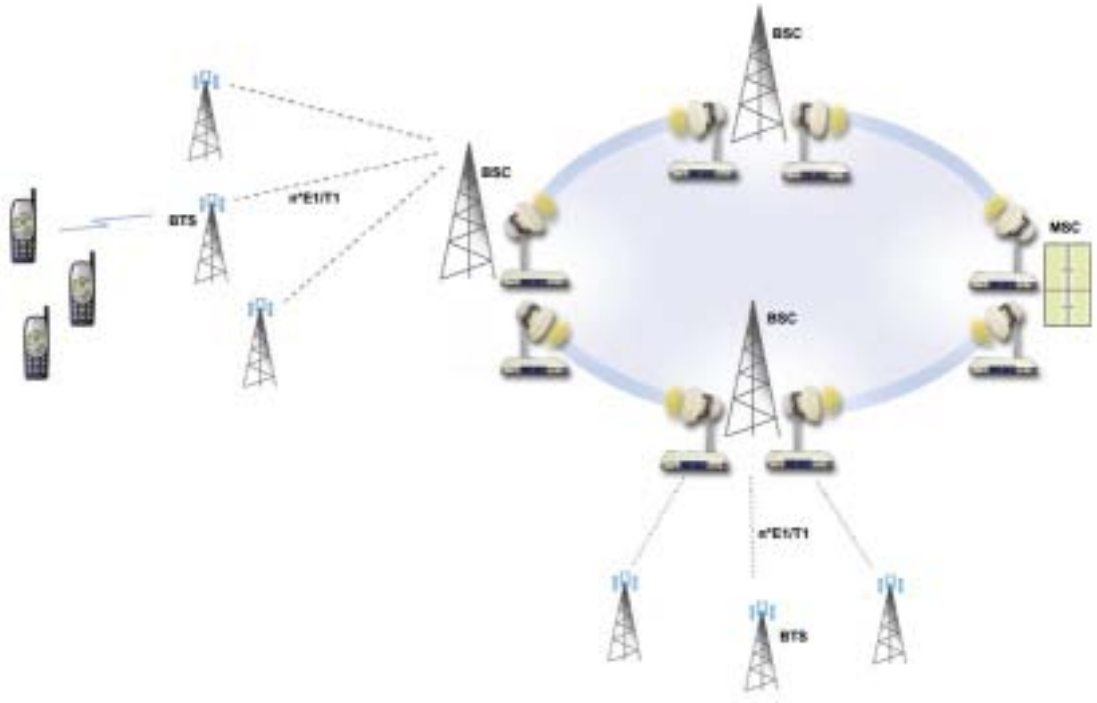


SONET/SDH Network Enhancement

FibeAir 1500/1528 is a revolutionary compact wireless solution for metropolitan high capacity SONET/SDH networks. In access applications, the system provides a ”last mile” high bit rate connection to large corporate networks or to remote distribution node carrying data, video and voice to multiple subscribers.

FibeAir includes an internal multiplexer that can provide a combination of OC-3/STM-1, DS3/E3, Ethernet/Fast Ethernet, T1/E1 interfaces. As a SONET/SDH network element, FibeAir can perform ring closures, ring interconnections and carry IP or ATM traffic over SONET/SDH.

Cellular Networks - MSC to BSC UPSR Ring



Cellular Networks - MSC to BSC UPSR Ring

High speed links allow for expansion of capacity in Cellular systems. Especially well-suited for creation of dense micro-cells.

Microwave ATM Networks

ATM was originally designed for transmission over error-free channels (e.g. fibers). Radio transmission is challenged by ATM, and ATM's basic and simple error correction mechanism needs to be strengthened for transmission over actual radio links.

Ceragon has chosen an ATM design solution, one that significantly improves the important cell transfer parameters. Furthermore, Ceragon's approach is optimized for ATM transport, but is also suitable for high-performance transmission of other payloads (e.g. SONET/SDH, Packet over SONET). No special configuration via management is required for any payload type.

The FibeAir system is optimally designed for microwave ATM transmission. Advanced algorithms minimize cell loss (CLR) and cell miss-insertion (CMR), and together with error correction mechanisms, ensure fiber-like quality transmission. The system can be integrated with ATM NTUs (Network Termination Units) and ATM access concentrators offering a wide variety of access solutions in capacities ranging from DS3/E3 to 155 Mbps.

Microwave ATM Networks

FibeAir 1500/1528 supports various services (CBR, VBR, and ATM UNI) at the customer premises. Designed for the most demanding data applications, FibeAir 1500/1528 meets the most stringent QoS requirements.

Corporate/Campus Networks

The FibeAir 1500/1528 system is a flexible, cost-effective solution for corporate networks and campus environment presenting a point-to-point, end-to-end broadband wireless alternative to expensive leased fiber lines. The FibeAir system provides a “one box” solution by integrating services such as Fast Ethernet, data, video and voice.

For pure Ethernet applications, FibeAir 1528 can be used to create virtual networks for LAN users (VLANs). FibeAir 1500/1528 provides two Fast Ethernet (100Base-TX) connections over 155 Mbps.

In addition, the FibeAir 1000 Digital Radio system offers LAN-to-LAN and PBX connectivity for campus networks, large enterprises, and metro last mile access. The system provides full throughput (up to 116 Mbps) Fast Ethernet connectivity together with up to 8 E1/T1 ports for TDM based information.

Corporate/Campus Networks

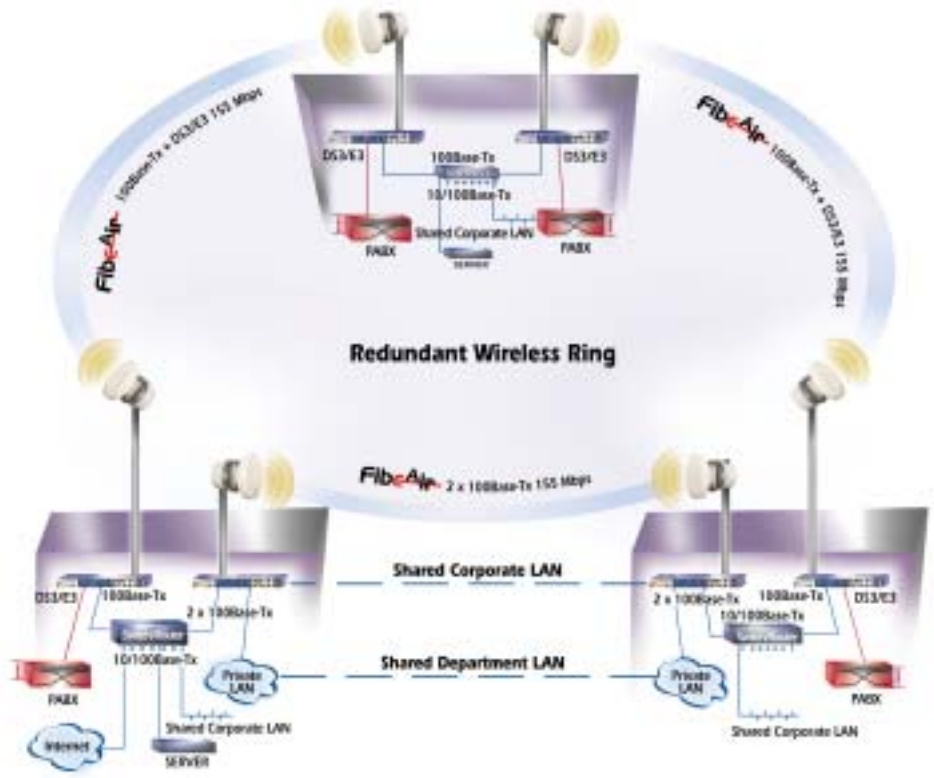
Integral Multiplexer

In the Telecom and Datacom environment, different interfaces are used. The FibeAir integral multiplexer supports both Telecom and Datacom interfaces by mapping the different data streams into the SONET/SDH payload.

The following applications using the FibeAir 1500/1528 system are available:

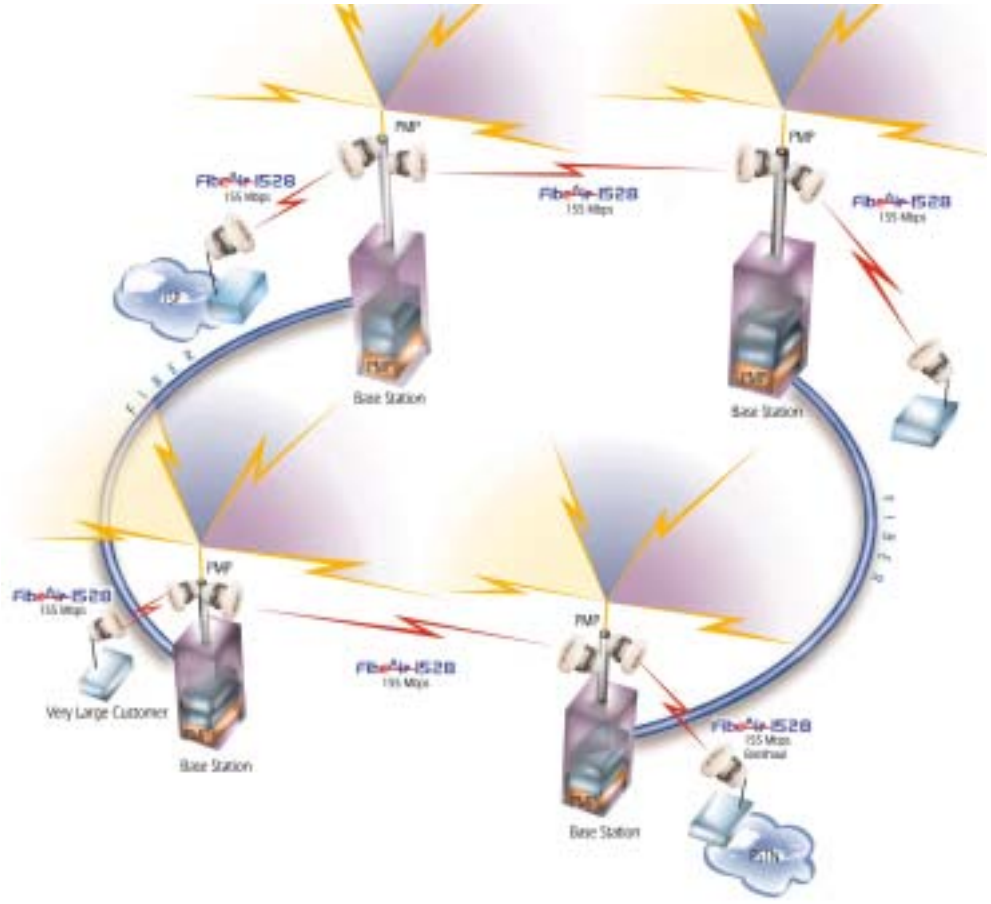
- **Fast Ethernet and DS3/E3 -** combines wireless Fast Ethernet and DS3/E3 interfaces for various applications such as the corporate and campus environment.
- **Fast Ethernet and 8xE1/T1** - combines wireless Fast Ethernet and 8xE1/T1 interfaces for various applications that require E1/T1 tributary lines.
- **3XE3, 3XDS3 -** broadband wireless solutions for Wide Area Networks (WANs), Metropolitan Area Networks (MANs) and Corporate/Campus applications.
- **2XFast Ethernet -** wireless Fast Ethernet applications for the Corporate and Campus environment and Internet Service Providers (ISPs).

The following figure illustrates a Telecom and Datacom Convergence wireless network.



Telecom/Datacom Convergence

LMDS Backhaul



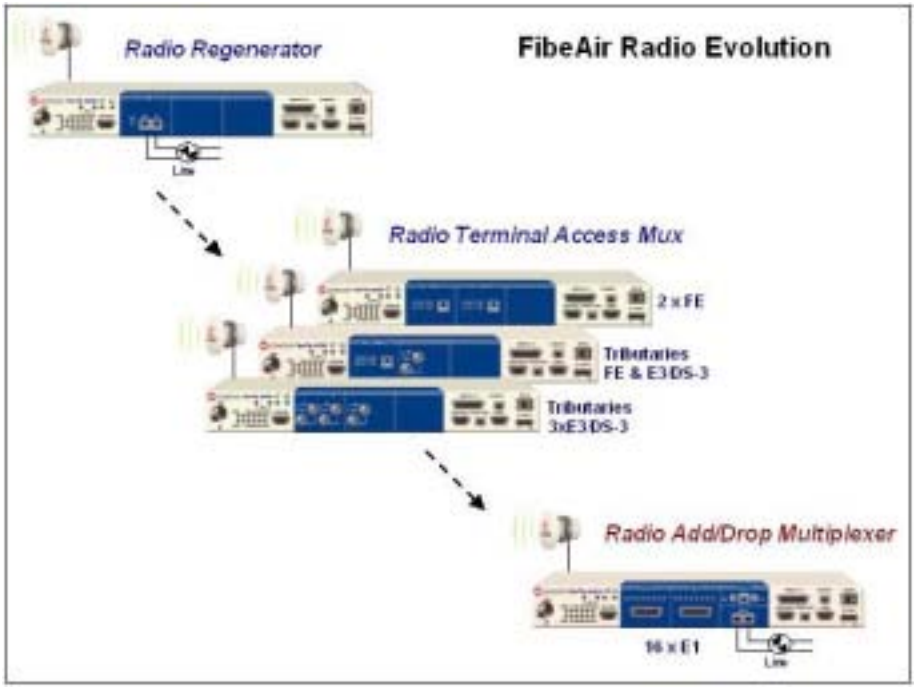
LMDS Backhaul

The high capacity FibeAir 1500/1528 is the ideal wireless building block for the LMDS Backhaul network. Operating in the LMDS frequency bands, the system offers a wireless SONET/SDH ring solution delivering high spectral efficiencies. The system can also provide 155Mbps link from a hub to a large customer, and additional connections can be made to the PSTN and ISP.

FibeAir 1500A/1528A

Ceragon's FibeAir Family includes FibeAir 1500A (16 QAM modem) and FibeAir 1528A (128 QAM modem). FibeAir 1500A/1528A is Ceragon's SDH IDU with a built-in Add-Drop Multiplexer. The built in ADM increases wireless network reliability and reduces overall network cost. Using FibeAir 1500A/1528A saves the network planner a substantial cost of installing a stand-alone ADM at each site where the add/drop-capability requirement does not exceed 32 E1s, and costs for training and spare parts.

Until FibeAir 1500A/1528A with its fully integrated ADM was introduced by Ceragon, the company provided point-to-point radio links throughout the world. With the introduction of FibeAir 1500A/1528A, Ceragon has broadened its scope to that of a wireless network solution provider, offering both regenerator and integrated network ADM units.



FibeAir 1500A/1528A is a one-box solution for 155 Mbps multiplexed data transmission. The system provides an OC-3/STM-1 wireless ring operating in the 6, 7, 8, 11, 13, 15, 18, 23, 26, 28, 32, and 38 GHz frequency bands. The unit is based on the same field-proven technology as the FibeAir 1500, with the addition and improvement of ADM-specific cards.

FibeAir 1500A/1528A supports chain and ring topologies. It can be used in pure SDH wireless networks or in mixed (wired and wireless) networks. The ability to add/drop traffic in each node of the network provides network flexibility and ease of planning. Ring topologies provide traffic protection without the need for redundant radio equipment as is required for protected (1+1) radio configurations.

The system supports path protection and synchronization mechanisms, and implements In-Band Management for seamless integration in the network.

Ceragon's management concept involves Ceragon management applications integrated with existing network management platforms.

FibeAir network management is controlled by Ceragon's network management software. CeraView™, Ceragon's SNMP-based GUI element manager, and PolyView™, Ceragon's open interface network management software, run on Windows 98/2000/NT and over HP OpenView (Windows or UNIX).

CeraView and PolyView extend HP OpenView functionality for Ceragon elements in the network.

Features

The following are features of the 1500A/1528A systems:

- Optimized carrier class wireless wireline solution for cellular and service providers.
- Provides up to 31 E1/T1 tributary interfaces per site, optical and/or radio aggregate.
- Path protection and network synchronization in accordance with SONET/SDH standards.
- External synchornization inputs/outputs.
- Unique SNMP-based element and network management, supports path protection and in-band management.

Applications

FibeAir 1500A/1528A supports ring and chain topologies, with full add-drop functionality and path protection in the ring. As a standard ADM, it can easily be integrated in the network with other vendor equipment.

FibeAir's standard in-band management capability enables management of external equipment and FibeAir products within the SONET/SDH network. External synchronization outputs are used to synchronize external equipment with the network.

FibeAir 1500A/1528A also supports cascaded topologies, and enables a "highway" type network that drops E1s/T1s at each node.

One possibilty for FibeAir 1500A/1528A deployment is as an access network transmission solution. Instead of Fiber-to-Curb/Building/Office (FTTC/FTTB/FTTO), FibeAir 1500A/1528A can be used for Radio-to-Curb/Building/Office (RTTC, RTTB, RTTO).

At rapidly developing sites using relatively old optical infrastructures, fiber lines may not reach the customer. In such cases, the service provider can use FibeAir 1500A/1528A units for inter-connection and service distribution.

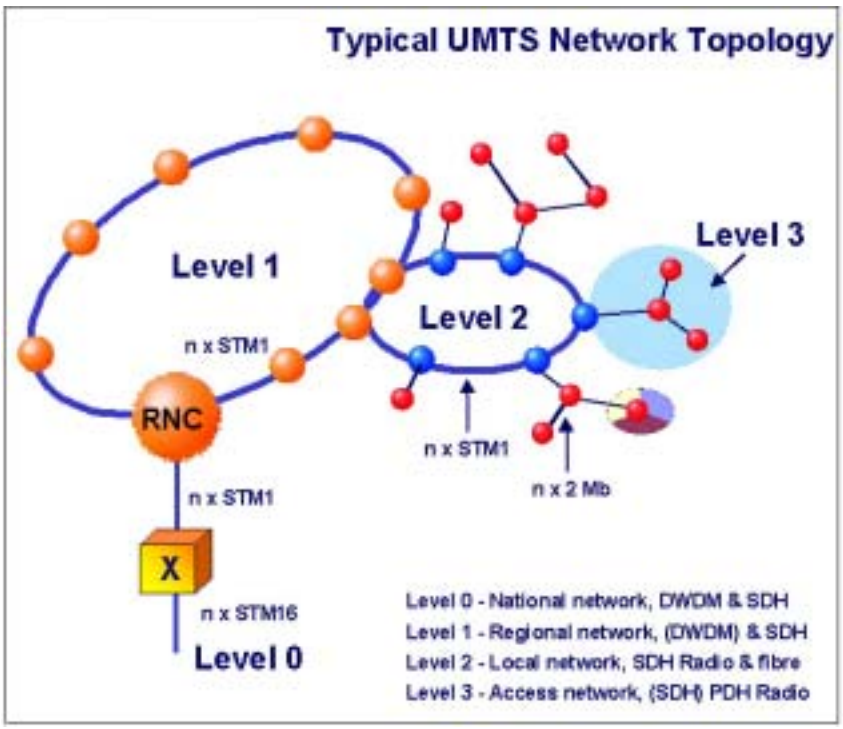
In many cases, customers obtain required capacity via leased lines. FibeAir 1500A/1528A can be used as a cost-effective alternative to leased lines and terminal equipment. In approximately three years, the initial investment in FibeAir 1500A/1528A will be returned, whereas use of leased lines over three years will yield much higher cost.

The following illustration shows FibeAir 1500A/1528A integrated in a typical wireless/wireline network.

FibeAir 1500A/1528A Integrated in a Wireless/Wireline Network

The following illustrations show FibeAir 1500A/1528A wireless network possibilities:

FibeAir 1500A/1528A Integrated in a Wireless SDH Access Ring



Generic UMTS Network Topology

FibeAir 1500A/1528A, with its integrated ADM, can provide the basis for the Level 1 and Level 2 rings shown in the illustration above.

FibeAir 1500P

FibeAir™ 1500P is Ceragon's modular ultra high capacity network connectivity solution designed to meet growing market demands for increased spectral-efficient systems.

FibeAir™ 1500P is designed to deliver double the capacity using a single 28 MHz channel. In addition, the system is modular, easy to install, and a cost-effective alternative to fiber.

With FibeAir™ 1500P operating in co-channel dual polarization (CCDP) mode, using the cross polarization interference canceller (XPIC) algorithm, two STM-1 signals can be transmitted over a single 28 MHz channel, using vertical and horizontal polarization. This enables double capacity in the same spectrum bandwidth.

A cost-effective STM-1 ring configuration is achieved using a single FibeAir™ 1500P IDU located at each of the nodes, with one ODU providing the West connection and another providing the East connection.

For upgrading to a 311 Mbps ring, the built in CCDP mode can be activated to use the same single 28 MHz channel and equipment.

FibeAir™ 1500P can also be configured as an STM-1 1+1 hot standby terminal, in a 1U IDU shelf, with either a single or double antenna installation.

FibeAir™ 1500P is equipped with an internal SNMP agent for easy integration with standard network management systems, and can also be managed via CeraView®, Ceragon's network element manager, and PolyView™, Ceragon's network management platform. FibeAir™ 1500P also provides an internal Ethernet hub for in-band transmission of third party management information.

As with other FibeAir™ Family products, FibeAir™ 1500P can operate together with any industry standard ADM.

Feaures

FibeAir™ 1500P features include the following:

- 311 Mbps over a single 28 MHz channel
- Cost-effective 155 Mbps ring solution, providing single 1U IDU for East-West connectivity
- Modular design for easy capacity upgrade
- Cost-effective 155 Mbps hot standby protection system
- Built-in Ethernet hub for in-band transmission of third party management information
- Operates in the 6-38 GHz frequency bands
- Compact, single 1U height IDU

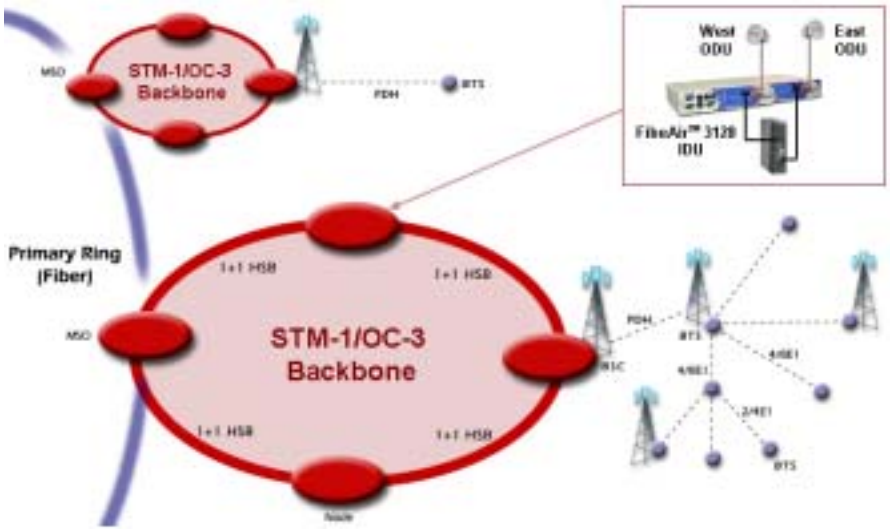
- Additional E1/T1 or Ethernet (10BaseT) over 2 Mbps Wayside Channel
- CeraView®, Java based SNMP element management application, and PolyView™, open interface network management application
- Supports FCC, ETSI, ITU-R, ITU-T, and IEEE standards

Applications

FibeAir 1500P can be configured as a cost-effective STM-1 ring solution, providing a single one-rack unit height IDU installation at any ring node.

Each node on the STM-1 ring consists of a single 1U Indoor Unit, providing both East and West connectivity at 155 Mbps, connecting to two Outdoor Units, East and West.

FibeAir equipment supports co-channel dual polarization (CCDP) mode, for future upgrade to 311 Mbps capacity over a single 28 MHz channel.



Single IDU Solution

FibeAir 1500S/1528S

In this modern age, data security is becoming more and more important for many organizations and service providers. Data security is required to protect the customer's privacy and the confidentiality of their businesses. Encryption technologies provide the highest data security level.

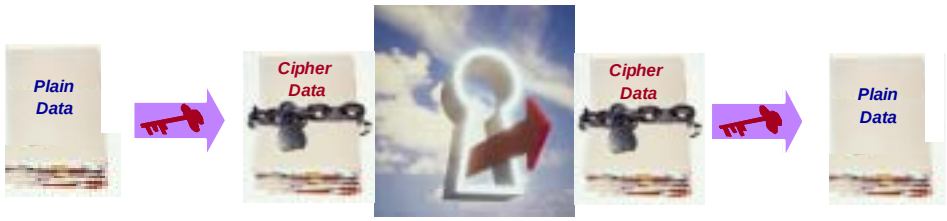
Encryption is a process that inverts the sensitive source information (plain data) to a pseudo-random series (encrypted data) before transmitting it to the target. This pseudo-random series is completely meaningless for all parties that don't share the common secret (encryption keys), while those who do can use it to decrypt the data back to meaningful information.

Due to the growing demand to enhance information security over the PTP wireless link, Ceragon Networks implemented the solution of adding another layer of protection against eavesdropping on the wireless signal and unauthorized access to the rooftop. Our proprietary solution is known as **EncryptAir™**, which is a system that enables the highest level of information security over the wireless medium, without degrading link performance.

The unique EncryptAir™ solution was integrated in our FibeAir family of products, introducing the first carrier class encrypted PTP wireless link.

Encryption Technology

Modern encryption techniques are based on several crucial elements, as shown in the following illustration:



Encryption Algorithm

The encryption algorithm is a uni-directional algorithm that randomizes information so that it cannot be deciphered without having the encryption keys.

An example of an encryption algorithm is DES (Data Encryption Standard), the most popular encryption standard, which is FIPS PUBS 46-3 (Federal Information Processing Standards Publications) compliant.

Encryption Keys

Encryption keys are the common secret between the source and the target, used as an input for the encryption algorithm to encrypt the plain data or decrypt the encrypted data.

Encryption keys can be either symmetric or asymmetric. A symmetric key requires the same secret key for both sides of the link. An asymmetric key requires a different secret key for both sides of the link.

Key Exchange

Since using the same encryption key for a long period of time will degrade encryption reliability, the key is replaced frequently, safely securing the encrypted data.

Encryption Synchronization

In order to decrypt the data correctly, the decryptor at the receiver side must be synchronized with the encryptor at the transmitter side. A synchronization protocol is used to keep both sides synchronized using the same key, the same initialization vector, and by starting at the same point.

Wireless Encryption

Wireless connections are more complex to encrypt. The need to overcome BER and fades in the radio channel, while maintaining the radio system performance, requires special handling.

The following figure shows a FibeAir encrypted link.

FibeAir Encrypted Link

The plain data passing through the FibeAir IDU is encrypted and transmitted to the ODU. The encrypted data protects the information flowing to the rooftop against potential eavesdroppers.

EncryptAir, Ceragon Networks' robust encryption mechanism, employs the DES algorithm, which is more suitable for wireless medium, while maintaining the field-proven FibeAir system quality performance.

EncryptAir™ - Ceragon Encryption

EncryptAir is based on proprietary Ceragon Networks technology and provides the first high capacity (155 Mbps+) wireless encryption connection.

EncryptAir implements the DES (Data Encryption Standard) algorithm, which uses symmetric encryption keys, a common secret between source and target, in order to encrypt/decrypt the data.

EncryptAir also implements proprietary algorithms that enable the highest level of information privacy.

Once established, each link has a unique set of encryption keys, allowing many links to operate in the same area, with no link intercepting the data of another link.

The following figure illustrates Ceragon's DES implementation. The standard DES core is empowered with Ceragon proprietary protocols to maintain DES algorithm strength in the wireless connection.

EncryptAir DES I*mplementation*

EncryptAir components include the following:

FPGA - The DES core is implemented in hardware to minimize additional end-to-end delay.

CKEP - Ceragon Key Exchange Protocol

CKEK - Ceragon Key Encryption Key

CESM - Ceragon Encryption Synchronization Mechanism

Automatic Key Management

Integrated in the FibeAir 1U IDU, the EncryptAir algorithm is completely transparent to the operator, functioning automatically without the need for manual key loading or replacement. Encryption can be disabled/enabled via the CeraView® management application.

Keys are the most important part of the encryption algorithm. Knowing the correct key enables the decryption of encrypted information. Not knowing the key makes it impossible to decrypt the data. Since there are more than 70,000,000,000,000,000 (seventy quadrillion) possible keys, the possibility of discovering a particular key is extremely unlikely when typical eavesdropping techniques are used. If the key is changed frequently, the risk of its discovery is diminished even further.

Unique Ceragon protocols were designed to generate secret keys and keep them safe and un-discoverable. The EncryptAir algorithm consists of random key generation, frequent key replacement, and a unique set of keys for each link, for operation in a dense wireless environment. The key consists of 64 binary digits (0s or 1s), whereby 56 bits are used directly by the encryption algorithm, and the remaining 8 bits are used for error detection (parity).

Encryption Performance

The encryption algorithm and protocols were designed to overcome BER and fades, enabling smooth operation over the wireless channel.

EncryptAir maintains the following system parameters:

- Effective bandwidth
- Throughput (payload rate)
- Delay
- BER performance
- System threshold (operation distance)

Supported Products

EncryptAir is available upon request in the following FibeAir Family products:

- FibeAir 1500/1528/3100/6200
- SDH/SONET, IP, and ATM traffic
- All frequencies (ETSI/FCC)

Supported Standards

- Federal Information Processing Standards Publications - FIPS PUB 46-3, Compatible (DES)
- NIST DES compliant, certification #152, as published in http://csrc.nist.gov/cryptval/des/desval.html

FibeAir 1500AL

FibeAir 1500AL is an optical full-functionality SDH ADM (Add-Drop Multiplexer). It supports all ADM features, such as path protection and synchronization, and provides two STM-1 optical aggregates, and *n* x E1 or STM-1 tributary lines.

FibeAir 1500AL supports chain and ring topologies. It can be used in pure SDH wireless networks or in mixed (wired and wireless) networks. The ability to add/drop traffic in each node of the network provides network flexibility and ease of planning. Ring topologies provide traffic protection without the need for redundant equipment as is required for protected (1+1) configurations.

The system supports path protection and synchronization mechanisms, and implements In-Band Management for seamless integration in the network.

Features

The following are features of the 1500AL system:

- Optimized carrier class wireline solution for cellular and service providers.
- Complies with SDH standards.
- Provides up to 16 E1 tributaries, or an STM-1 tributary interface and an electrical/optical aggregate.
- Path protection and network synchronization.
- External synchornization inputs/outputs.
- Unique SNMP-based element and network management, supports path protection, clock synchronization, NTP server connection, and in-band management.
- Up to 4 FibeAir 1500AL IDUs can be stacked to provide connections for up to 63 E1s. Or, alternatively, FibeAir 1500AL can be configured with an STM-1 tributary and an STM-1-to-63 E1 Access Mux.
- Provides remote software download for Ceragon units in the system.

Applications

FibeAir 1500AL supports ring and chain topologies, with full add-drop functionality and path protection in the ring. As a standard ADM, it can easily be integrated in the network with other vendor equipment.

FibeAir's standard in-band management capability enables management of external equipment and FibeAir products within the SDH network. External clock signals can be input for precise synchronization with other equipment in the network.

FibeAir 1500AL also supports cascaded topologies, and enables a "highway" type network that drops E1s at each node.

FibeAir Family System Overview

General

The Ceragon FibeAir Family is available in 6-38 GHz frequency bands to meet user requirements. The FibeAir system consists of an Indoor Unit (IDU), an Outdoor Unit (ODU), and a high-performance antenna. (FibeAir 1500AL does not include an ODU and antenna.)

FibeAir Main Modules

Indoor Unit (IDU)

A compact, 17” wide, 1U-high unit, mount compatible for both ETSI and ANSI standard racks. The IDU includes physical line interfaces, a full-function SONET/SDH regenerator internal multiplexer, an advanced modem, and a main manager card. The IDU can also include optional encryption modules for secure data transfer.

Indoor Unit (IDU)

IDU major functions:

- Modulate/demodulate the 155 Mbps SONET/SDH payloads.
- Local and remote system management and control (IDU + ODU).
- Provide interfaces for 2 Mbps wayside channel, 64 Kbps user channel and 64 Kbps Order Wire channel.
- Provide I/O line alarms.
- Integral multiplexer enables Datacom and Telecom applications convergence.

Outdoor Unit (ODU)

Outdoor Unit (ODU)

The ODU consists of high sensitivity RF circuitry with half band tuning range for most frequencies. An independent controller controls the ODU and its functions, and communicates with the IDU. This controller provides the IDU precise received levels (in dBm) and other indications.

The ODU, which is adjacent to the antenna, is enclosed in a compact, weather-proof enclosure and connects to the IDU via a single coaxial cable of up to 300 m (1000 ft).

ODU major functions:

- Interface between antenna and IDU (reception/transmission of microwave signals).
- Power transmission control.

Antenna

The high-performance antenna is available in the following lengths:
1’ (30 cm), 2’ (60 cm), 3’ (90 cm), 4’ (120 cm), or 6’ (180 cm). For low frequencies (6-11 GHz), other antenna sizes (8-15 ft) are available.

CeraView Management Application

The system is managed either remotely or locally by CeraView, Ceragon’s SNMP-based software, running on either Windows 98/2000/NT or UNIX platform, with user-friendly graphical user interface. Ceragon NMS functions are in accordance with ITU-T recommendations for TMN.

CeraView Management Application

PolyView Management Application

PolyView is Ceragon's powerful yet user-friendly NMS (Network Management System) that integrates with other NMS platforms (currently HP OpenView), and systems in which no NMS is used. It provides management functions for Ceragon's FibeAir systems at the network level and individual network element level.

PolyView also has its own user-friendly interface called **CeraMap** (shown in the example below).

PolyView Management Application

In-Band Management

In-Band Management refers to a method whereby the network management software sends management packets through the same network it is managing. This differs from out-band management in which the network management software uses a different network (overlay network) in order to communicate with the managed elements.

Ceragon IDUs are capable of forwarding IP packets to Ethernet ports, Serial ports, SDH lines (in the overhead) and Radio interfaces (in the overhead).

The general idea of In-Band Management is that when a packet arrives at an IDU, the software in the IDU checks the IP packet and follows one of two basic scenarios:

- If the destination IP address of the packet is the same as the IP address of the IDU, pass the packet to the IP layer for further processing.
- If the destination IP address of the packet is different than the IP address of the IDU:
  - If the packet arrived from within the ring, send it to the other side. If that side is down, send it back to its origin.
  - If the packet arrived from outside the ring, send it to the radio side. If that side is down, send it to the line side.
  - If the packet belongs to an address outside the ring, send it through the Ethernet port.

Ceragon's FibeAir wireless system provides flexibility in In-Band Management implementation.

The following methods can be used to implement In-Band Management in the FibeAir system:

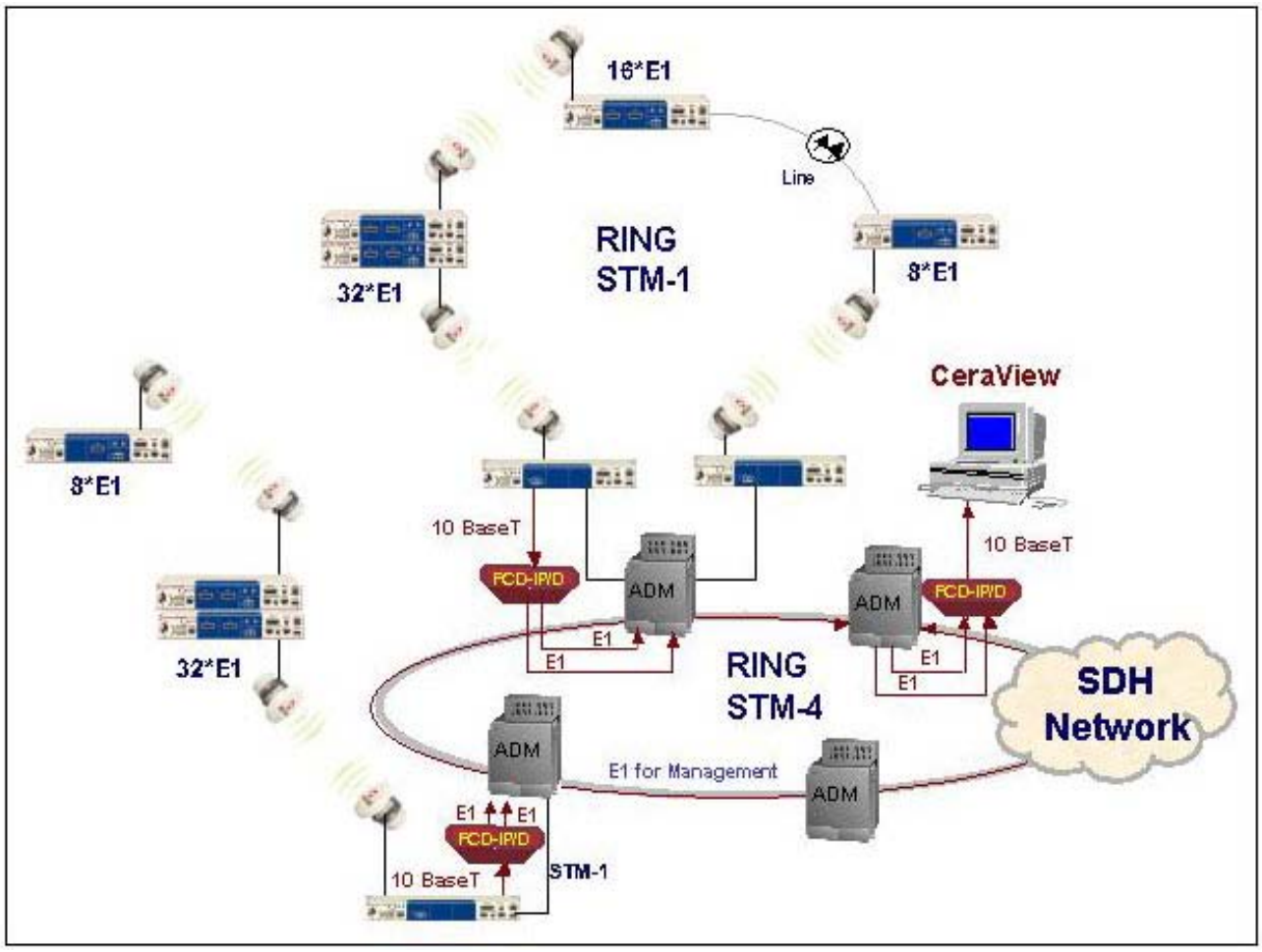
- Transferring DCCr bytes through the radio and the network.
- Transferring DCCr bytes through the radio, but not through the network.
- Transferring DCCr bytes through the 10BaseT wayside channel.

Out-of-Band Management

Out-of-Band Management refers to a method whereby CeraView management signals are transmitted over E1s using FCD-IP/D routers. It is used when several Ceragon sub-networks (ring and chain) are connected to a SONET/SDH network that includes other vendor equipment which do not transparently transmit the DCCR/DCCM data control channels. In such cases, Ceragon sub-networks employ In-Band Management among themselves, and Out-of-Band Management throughout the rest of the network, via FCD-IP/D routers.

Each Ceragon sub-network has a 10BaseT connection to CeraView at the NOC (Network Operation Center). The connection uses one E1 of the transport network, whereby up to 30 sub-networks can be managed using a sinlgle E1 connection.

Management data is protected using the RIP protection method.



Example of Ceragon's Out-of-Band Management Implementation

In the illustration above, the STM-1 ring uses In-Band Management, while the STM-4 ring uses Out-of-Band Management.

Interfaces

The following interfaces are common to some FibeAir systems. Consult the relevant FibeAir interface description below for specific availability.

Wayside Channel Interface

Plug-in 1.544/2.048 Mbps interface module with standard connectors:

- T1/E1, ITU-T G.703 (supports either balanced or unbalanced interface, BNC connector).
- V.35, X.21, RS-530, V.36 (relevant connectors).
- Ethernet bridge (RJ-45 connector).

User Channel Interface

64 Kbps interface module with an RS-232/V.25 (9-pin) interface or Ethernet bridge (RJ-45).

Order Wire Analog Interface

Analog audio interface for use with a supplied headset (microphone and earphone) through a standard mini audio jack. A buzzer and a panel switch (for far-end signaling) are also included.

External Alarms

FibeAir supports 13 programmable floating contacts for external alarms, 8 for input and 5 for output.

Protected Configuration

FibeAir can be configured for protection based on inter-connection between two or more terminals (see *Chapter 7 - Protected Configuration*).

FibeAir 1500/1528 Interfaces

FibeAir 1500A/1528A provides the following interfaces:

- STM-1/OC3 Multi Mode Optical Modules: 1300 nm, ST connector.
- STM-1/OC3 Single Mode Optical Modules: 1300 nm or 1500 nm, normal or extended range, ST, FC or SC connectors.
- STM-1/OC3 Electrical (Coax) Modules: CMI coding, 75Ω, BNC connector.

FibeAir 1500A/1528A Interfaces

FibeAir 1500A/1528A provides the following aggregate interfaces:

- STM-1/OC3: multi-mode optical modules, 1300 nm, ST connector.
- STM-1/OC3: single mode optical modules, 1300 nm or 1500 nm, normal or extended range, ST, FC or SC connectors.
- RF: N-type
- TDM: E1/T1 tributary, 120/100 Ohm balanced

Note: FibeAir 1500A/1528A does not include a Wayside Channel option.

FibeAir 1500P Interfaces

FibeAir 1500P provides the following interfaces:

- STM-1/OC-3, Electrical: CMI/BNC
- STM-1/OC-3, Optical: SM/MM
- Fast Ethernet: 100BaseTx/Fx
- TDM: 8 x E1/T1

Note: FibeAir 1500P does not include a User Channel option.

FibeAir 1500AL Interfaces

FibeAir 1500AL provides the following interfaces:

- STM-1 Electrical: CMI/BNC
- STM-1 Optical: SM/MM
- TDM: 8 x E1/T1

Note: FibeAir 1500AL does not include a Wayside Channel option.

Chapter 2

Theory of Operation

This chapter describes the FibeAir Family system and how it operates.

The FibeAir design concept is based on universal radio architecture.

FibeAir 1500/1528

A FibeAir 1500/1528 radio link consists of two FibeAir terminals. Each terminal includes three major components, IDU, ODU, and Antenna. A single cable, carrying communications and DC power, connects the IDU to the ODU.

System Block Diagram

The following figure shows the FibeAir 1500/1528 main modules and components.

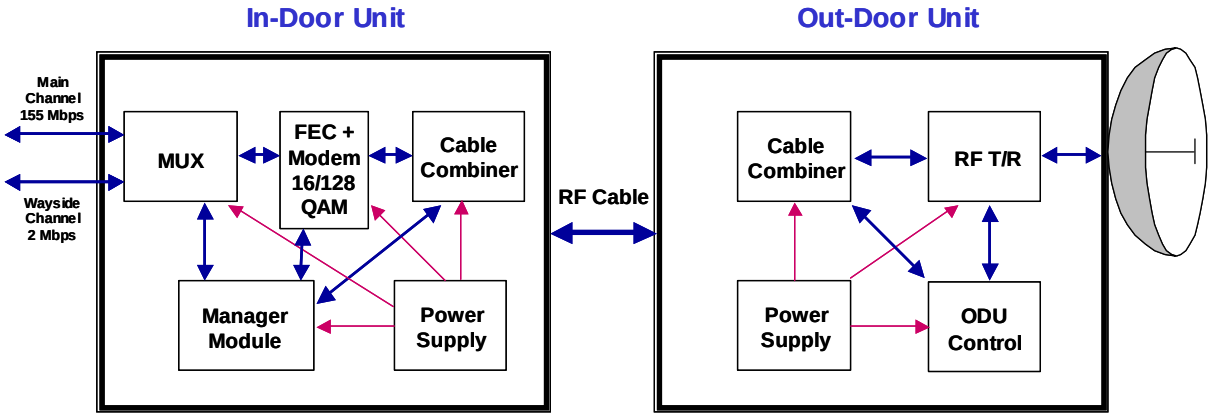


Figure 2-1 FibeAir 1500/1528 System Block Diagram

In Door Unit (IDU)

The IDU is a compact, 17” wide, 1U-high unit, mount compatible for both ETSI and ANSI standard racks. The IDU modulates/demodulates the 155 Mbps Sonet/SDH payloads, manages local and remote units, provides I/O line alarms, and provides interfaces for 1.544/2.048 Mbps Wayside channel, 64 Kbps User channel and 64 Kbps Order Wire channel.

The IDU also interfaces a Local Maintenance Terminal or Network Management System. In addition, status alarms and indicators are provided on the front panel.

The main IDU modules include:

- Network Interfaces
- Multiplexer (MUX)
- Modem
- Manager Card
- Cable Interface
- Power Supply

Multiplexer

The MUX module functions as a Sonet/SDH Regenerator. On the line side it interfaces the OC-3/STM-1 stream, and on the radio side the Modem module.

As a regenerator, the MUX either terminates or regenerates the OC-3/STM-1 RSOH. In one direction, the OC-3/STM-1 stream, interfacing through the MUX Rx line input terminates and the resulting stream is transmitted to the Modulator in the Modem module.

In the opposite direction, the stream coming from the Modem’s Demodulator, undergoes OC-3/STM-1 Regeneration in the MUX, and transmitted through the MUX Tx line output.

In addition, the MUX module uses the OC-3/STM-1 SOH bytes to support other services: 1.544/2.048 Mbps Wayside channel and management, 64 Kbps User Channel and Order Wire channel.

The MUX module may be configured via software for transparency of most of the SOH bytes for maximum system transparency and non-intervention, at the cost of reduced functionality and services.

The multiplexer module enables to integrate different interfaces and services into the SDH payload to converge Datacom and Telecom applications.

Modem

FibeAir 1500 is equipped with a 16-state QAM modem.

FibeAir 1528 is equipped with a 128-state QAM modem.

The modem delivers a 155 Mbps payload in 50/56 MHz channel bandwidth for 16 QAM, and 27.5/28 MHz for 128 QAM, in compliance with FCC/ETSI standards.

The modem is equipped with Digital Signal Processing functions as follows:

- Digital IF - I/Q modulator/demodulator whose functions are:
  - Conversion of the modulated signal to/from the IF frequency.
  - Automatic level equalization on the signal from ODU.
  - Protection against overloads.
- Timing recovery techniques employing digital tracking loop.
- FEC ensures unfaded BER lower than 10^{-13}.

The following figure illustrates a measured 16 QAM constellation.

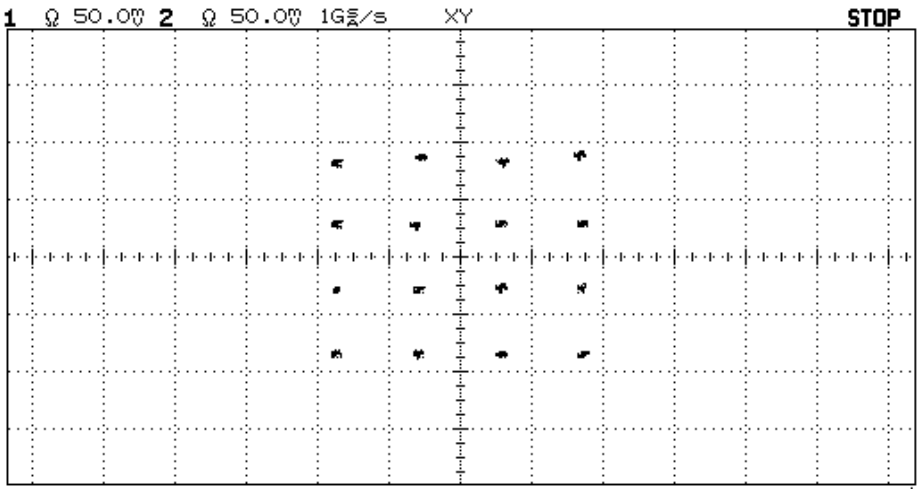


Figure 2-2 16 QAM Constellation

The following figure illustrates a measured 128 QAM constellation.

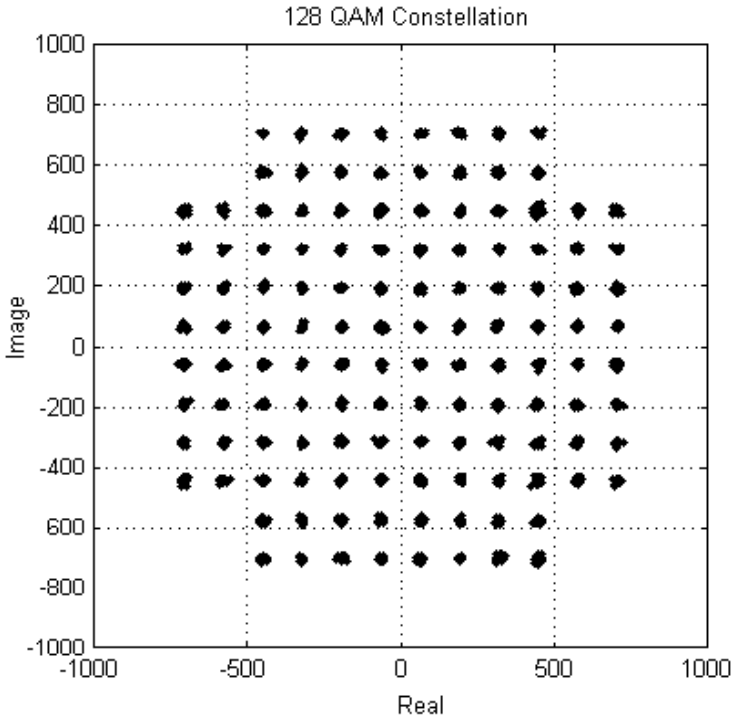


Figure 2-3 128 QAM Constellation

Manager Module

The Manager module controls and manages all system modules of the local and remote units.

The Manager module also supports the user interface through Ethernet or PPP/SLIP to the management station, and an ASCII terminal port. A local or dumb terminal can be used for basic configuration and performance monitoring.

Other features include:

- Log file
- Remote software and firmware download (upgrades can be downloaded from local to remote)
- Performance monitoring

Cable Interfaces

A single coaxial cable connects the IDU to the ODU. This cable carries the following signals:

- Transmit (350 MHz) and receive (140 MHz) modulated signals.
- Transmit (8 MHz) and receive (4 MHz) control data and communications between the IDU manager and the ODU controller.
- DC power from the IDU to the ODU (-48 VDC).

The system automatically issues an alarm if the cable is disconnected and provides protection against shorts. Furthermore, there is no need to measure and define the length and type of cable used since the system automatically compensates cable parameters.

The following figure illustrates the signal direction through the coaxial cable.

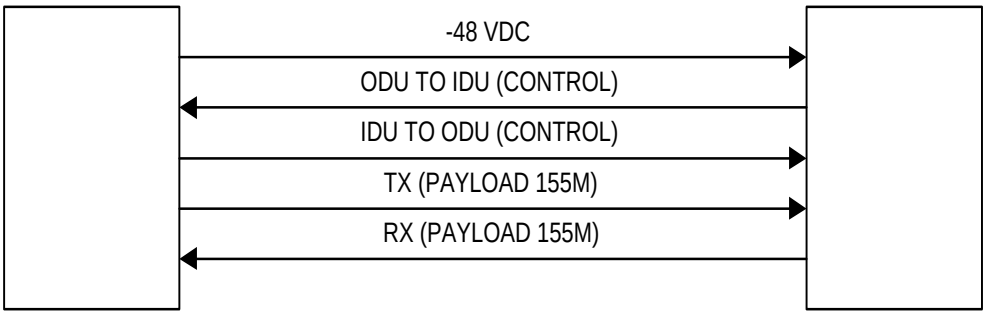


Figure 2-4 Signal Direction Through the Coaxial Cable

Power Supplies

The power supply features:

- Standard Input: -48 VDC
- DC input range: -40.5 VDC to -72 VDC
- DC/DC converter.
- Reverse polarity protection.
- Over-voltage and over-current protection.
- Detection of IDU-ODU cable alarms (i.e. cable open, cable short).

The ODU receives its DC power from the IDU. The PWR LED on the front panel of the IDU continuously lights to indicate the existence of input voltage.

Out Door Unit (ODU)

The ODU is designed to be fastened to the antenna using four latches. The antenna is mounted on a standard mounting pole. The ODU is enclosed in a compact, weather proof enclosure and connects to the IDU via a single coaxial cable that can extend up to 300m (1000 ft).

The ODU major modules include:

- T/R Module - A high sensitivity RF circuitry with full band frequency tuning range.
- Controller - Controls the ODU and provides ODU status signals, and accurate received signal level (RSL) reading (in dBm).
- Cable Combiner.
- Power Supply.

Figure 2-5 ODU Mounted on the Antenna

Note: For FibeAir systems operating at 6, 7, or 8 GHz, the ODU is connected to an external diplexer via an adapter plate. See the end of *Chapter 3 - Installation* for details concerning the dipelxer.

FibeAir 1500A/1528A

FibeAir 1500A/1528A is Ceragon's SDH IDU with a built-in Add-Drop Multiplexer. The built in ADM increases system reliability and reduces overall system cost.

Using FibeAir 1500A/1528A saves the network planner a substantial cost of installing stand-alone ADMs.

If site expansion is necessary at a later time beyond 32 E1s, FibeAir 1500A/1528A IDUs can be replaced by a combination of FibeAir 1500 (Radio SDH Regenerators) and external ADMs. FibeAir 1500A/1528A can then be used elsewhere in the network.

FibeAir 1500A/1528A supports chain and ring topologies. It can be used in pure SDH wireless networks or in mixed (wire and wireless) networks. The ability to add/drop traffic in each node of the network provides network flexibility and ease of planning. Ring topologies are important for protected configurations, and for redundant traffic loads when protection is not configured.

System Block Diagram

The following figure shows the FibeAir 1500A/1528A main modules and components.

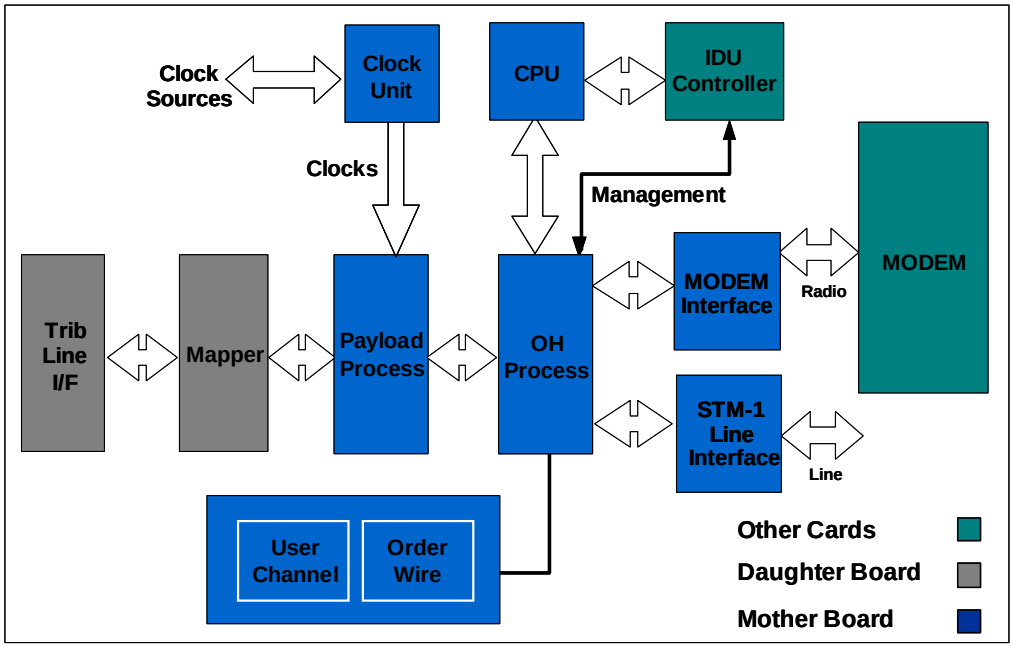


Figure 2-6 FibeAir 1500A/1528A System Block Diagram

The FibeAir 1500A/1528A ADM demultiplexes high-speed traffic streams to lower-speed components, so that an additional low-speed channel can be added.

In networks that cannot identify available low-speed channels within a high-speed bit stream, the ADM is required to demux the high-speed traffic to lower-speed circuits.

As shown in the block diagram, the FibeAir Add-Drop Multiplexer IDU includes the following functions:

Controller	Handles configuration and control of all functional units, including trail configurations, protection algorithms, network management tasks, performance monitoring, alarms detection/generation, and diagnostics.
Modem Interface	Performs full STM1 termination, including framing and scrambling mechanisms, and LOF detection.
STM1 Line Interface	Optical STM1 line interface, includes support for different optical transceiver types, clock recovery, clock synthesis, serial-to-parallel alignment (and vice versa), and LOS/LOF detection.
OH Processing	Handles insertion and extraction of Section Overhead and Path Overhead bytes, including PM bytes (B1, B2, B3), management (DCCR, DCCM, Media-Specific), APS channel bytes (K1, K2), trace identifiers (J0, J1), user channel (F1), order-wire (E1), synchronization status message (S1), path signal label (C2), path status (G1), and others. The module also handles AIS and RDI detection and generation.
Payload Processing	Handles insertion and extraction of payload envelopes within VC4/VC3 containers, AU pointers (H1, H2, H3) processing (generation and interpretation), accommodation of phase and frequency differences between incoming and outgoing frames via pointer adjustment, multi-frame alignment, TU pointer processing (V1-V4), LOP and LOM detection, and generation of all traffic control signals.
Mapper	Maps PDH signals to VC12/VC11/VC3 virtual containers, handles TU pointers (V1-V4) generation and interpretation, and TU Overhead (V5, J2, N2, K4) termination and processing.
Tributary Line Interface	Handles PDH line termination, clock and data recovery, decoding/encoding, and line performance monitoring.
Clock Unit	ADM synchronization module with very accurate internal source clock. The module receives different clock sources and re-synchronizes network elements. It also performs tasks required by hitless switching, holdover function, jitter and wander attenuation, and others.
Auxiliary Channels	User Channel (64 Kbps RS-232 data channel), and Order-Wire (64 Kbps audio channel).

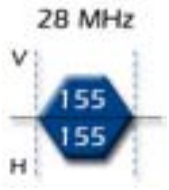
FibeAir 1500P

FibeAir™ 1500P is designed to deliver double the capacity using a single 28 MHz channel. In addition, the system is modular, easy to install, and a cost-effective alternative to fiber.

With FibeAir™ 1500P operating in co-channel dual polarization (CCDP) mode, using the cross polarization interference canceller (XPIC) algorithm, two STM-1 signals can be transmitted over a single 28 MHz channel, using vertical and horizontal polarization. This enables double capacity in the same spectrum bandwidth.

By adding an additional Indoor Unit and two Outdoor Units, the FibeAir 1500P SDH ring can be upgraded to transmit at 311 Mbps. Since the existing units support the co-channel dual polarization (CCDP) mode, once this mode is activated, the cross polarization interference canceller (XPIC) allows two STM-1 signals (311 Mbps) to be transmitted over the existing single 28 MHz channel. In this system, both horizontal and vertical polarizations are used simultaneously, transmitting a 155 Mbps signal to provide 311 Mbps throughput.

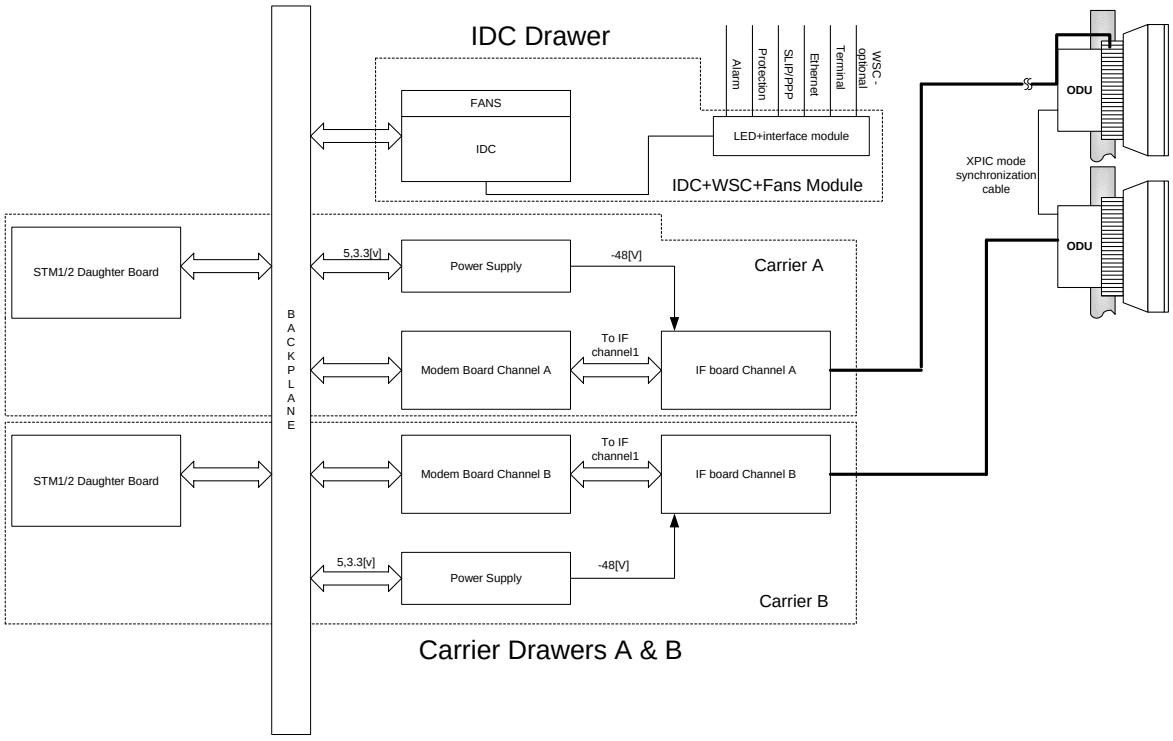
The XPIC feature ensures an error-free connection despite conditions such as rain.



Dual Polarization

System Block Diagram

The following figure shows the FibeAir 1500P main modules and components.



As shown in the block diagram, the FibeAir 1500P IDU includes the following sections and functions:

IDC Drawer The drawer on the left side of the IDU front panel. Includes IDC (IDU Controller), Wayside channel (optional), and replaceable fan unit.

Carrier Drawers The drawers to the right of the IDC Drawer. Include multiplexers, modem interfaces, line interfaces, and power supply units.

IDC (IDU Controller) Handles configuration and control of all functional units, including trail configurations, protection algorithms, network management tasks, performance monitoring, alarms detection/generation, and diagnostics.

Multiplexer Receives data delivered via different communication protocols (such as DS-3, Ethernet, etc.) and converts it to a standard SDH framework for transmission through the air. On the receiving end, this module separates the SDH payload and overhead and reconstructs the original data that was converted.

Power Supply The ODU receives its DC power from the IDU. The PWR LED on the front panel of the IDU continuously lights to indicate the existence of input voltage. The DC input range is -40.5 VDC to -72 VDC.

Modem Upon transmission, performs data conversion from the baseband frequency to the IF frequency. Upon receiving, performs data conversion from the IF frequency to the baseband frequency. It also performs AGC (Automatic Gain Control).

Line Interface Performs data framing and scrambling, and LOF detection.

FibeAir 1500AL

FibeAir 1500AL, a member of the FibeAir family of products, is Ceragon's optical full-functionality SDH ADM (Add-Drop Multiplexer).

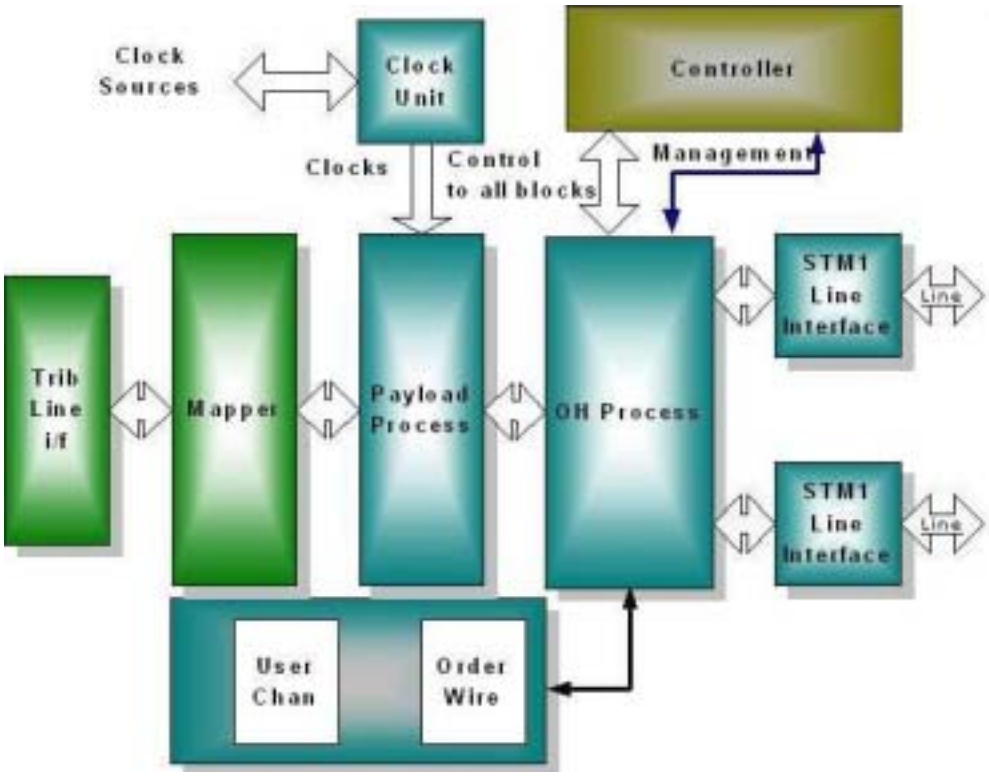
FibeAir 1500AL supports all ADM features, such as path protection and synchronization, and provides two STM-1 optical aggregates, and *n* x E1 or STM-1 tributary lines.

FibeAir 1500AL is managed by CeraView®, Ceragon's element manager, and PolyView™, Ceragon's network manager.

PolyView provides end-to-end trail management for FibeAir 1500AL.

System Block Diagram

The following figure shows the FibeAir 1500AL main modules and components.



As shown in the block diagram, the FibeAir 1500AL IDU includes the following functions:

Controller — Handles configuration and control of all functional units, including trail configurations, protection algorithms, network management tasks, performance monitoring, alarms detection/generation, and diagnostics.

STM1 Line Interface	Optical STM1 line interface, includes support for different optical transceiver types, clock recovery, clock synthesis, serial-to-parallel alignment (and vice versa), and LOS/LOF detection.
OH Processing	Handles insertion and extraction of Section Overhead and Path Overhead bytes, including PM bytes (B1, B2, B3), management (DCCR, DCCM, Media-Specific), APS channel bytes (K1, K2), trace identifiers (J0, J1), user channel (F1), order-wire (E1), synchronization status message (S1), path signal label (C2), path status (G1), and others. The module also handles AIS and RDI detection and generation.
Payload Processing	Handles insertion and extraction of payload envelopes within VC4/VC3 containers, AU pointers (H1, H2, H3) processing (generation and interpretation), accommodation of phase and frequency differences between incoming and outgoing frames via pointer adjustment, multi-frame alignment, TU pointer processing (V1-V4), LOP and LOM detection, and generation of all traffic control signals.
Mapper	Maps PDH signals to VC12/VC11/VC3 virtual containers, handles TU pointers (V1-V4) generation and interpretation, and TU Overhead (V5, J2, N2, K4) termination and processing.
Tributary Line Interface	Handles PDH line termination, clock and data recovery, decoding/encoding, and line performance monitoring.
Clock Unit	ADM synchronization module with very accurate internal source clock. The module receives different clock sources and re-synchronizes network elements. It also performs tasks required by hitless switching, holdover function, jitter and wander attenuation, and others.
Auxiliary Channels	User Channel (64 Kbps RS-232 data channel), and Order Wire (64 Kbps audio channel).

FibeAir Family System Specifications

General

155 Mbps, 16/128 QAM, Single Carrier

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Standards	FCC, ETSI	ETSI, Canada	FCC, ETSI	ETSI	ETSI	FCC, ETSI
Operating Fequency Range	5.925-6.425 GHz, 6.425-7.1 GHz	7.1-8.5 GHz	10.7-11.7 GHz	12.75-13.25 GHz	14.5-15.35 GHz	17.7-19.7 GHz
Tx/Rx Spacing	240, 252.04, 260, 266, 340 MHz	119, 154, 161, 168, 182, 196, 245, 311.32 MHz	500, 520, 530,490 MHz	266 MHz	315, 420, 475, 728 MHz	1010, 1560 MHz
RF Channel Spacing 16 QAM / 128 QAM	128 QAM: 28/30/40 MHz	128 QAM: 28/29.65 MHz	128 QAM: 28/30/40 MHz	128 QAM: 28 MHz	128 QAM: 28 MHz	16 QAM: 50/55/80 MHz 128 QAM: 40/27.5 MHz

23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
Standards	FCC, ETSI	ETSI	FCC, ETSI, Canada	ETSI	ETSI/FCC
Operating Fequency Range	21.2-23.6 GHz	24.5-26.5 GHz	LMDS. A1, A2, B, LMCS, ETSI	31.8-33.4 GHz	37-38.4, 38.6-40, 37-39.5 GHz
Tx/Rx Spacing *	1008, 1200, 1232 MHz	1008 MHz	350-500, 1008 MHz	812 MHz	700, 1260 MHz
RF Channel Spacing	16 QAM: 50/56 MHz 128 QAM: 30/28 MHz	16 QAM: 56 MHz 128 QAM: 28 MHz	16 QAM: 50/56 MHz 128 QAM: 28 MHz	128 QAM: 28 MHz	16 QAM: 50/56 MHz 128 QAM: 28 MHz

* *For additional Tx/Rx schemes, please contact your Ceragon representative.*

All Frequencies

Capacity	155 Mbps
Modulation Type	16 QAM/128 QAM
Frequency Stability	16 QAM: ±0.0005%, 128 QAM: ±0.001%
Frequency Source	Synthesizer
RF Channel Selection	Via NMS
System Configurations	Non-Protected (1+0), Protected (1+1), Space Diversity, Frequency Diversity

311 Mbps, 128/256 QAM, Single Carrier

18-38 GHz

Specification	18 GHz	23 GHz	26 GHz	28 GHz	38 GHz
Standards	FCC, ETSI	FCC, ETSI	ETSI	FCC, ETSI	ETSI, FCC
Operating Fequency Range	17.7-19.7 GHz	21.2-23.6 GHz	24.5-26.5 GHz	LMDS. A1, A2, B, LMCS, ETSI	37-38.4, 38.6-40/37-39.5 GHz
Tx/Rx Spacing *	1010, 1560 MHz	1008, 1200, 1232 MHz	1008 MHz	350-500, 1008 MHz	700, 1260 MHz
RF Channel Spacing	128 QAM: 55 MHz 256 QAM: 80 MHz	128 QAM: 56 MHz 256 QAM: 50 MHz	128 QAM: 56 MHz	128 QAM: 56 MHz 256 QAM: 50 MHz	128 QAM: 56 MHz 256 QAM: 50 MHz

* *For additional Tx/Rx schemes, please contact your Ceragon representative.*

All Frequencies

Capacity	311 Mbps
Modulation Type	128 QAM/256 QAM
Frequency Stability	±0.001%
Frequency Source	Synthesizer
RF Channel Selection	Via NMS
System Configurations	Non-Protected (1+0), Protected (1+1)

116 Mbps, 32 QAM, Single Carrier

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Standards	FCC, ETSI	ETSI, Canada	FCC, ETSI	ETSI	ETSI, FCC, Canada	FCC, ETSI
Operating Fequency Range	5.925-6.425 GHz, 6.425-7.1 GHz	7.1-8.5 GHz	10.7-11.7 GHz	12.75-13.25 GHz	14.5-15.35 GHz	17.7-19.7 GHz
Tx/Rx Spacing	240, 252.04, 260, 266, 340 MHz	119, 154, 161, 168, 182, 196, 245, 311.32 MHz	500, 520, 530,490 MHz	266 MHz	315, 420, 475, 728 MHz	1010, 1560 MHz
RF Channel Spacing	28 MHz	28 MHz	28, 30, 40 MHz	28 MHz	28 MHz	27.5, 40 MHz

23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
Standards	FCC, ETSI	ETSI	FCC, ETSI, Canada	ETSI	ETSI, FCC
Operating Fequency Range	21.2-23.6 GHz	24.5-26.5 GHz	LMDS. A1, A2, B, LMCS, ETSI	31.8-33.4 GHz	37-38.4, 38.6-40/37-39.5 GHz
Tx/Rx Spacing *	1008, 1200, 1232 MHz	1008 MHz	350-500, 1008 MHz	812 MHz	700, 1260 MHz
RF Channel Spacing	28, 50 MHz	28 MHz	28, 50 MHz	28 MHz	28, 50 MHz

* *For additional Tx/Rx schemes, please contact your Ceragon representative.*

All Frequencies

Capacity	116 Mbps (100BaseT+8xE1/T1)
Modulation Type	32 QAM
Frequency Stability	±0.001%
Frequency Source	Synthesizer
RF Channel Selection	Via NMS
System Configs	Non-Protected (1+0), Protected (1+1)

Supported Standards

Frequency	Standards
6 GHz	EN 300 234
7 GHz	EN 300 234, ITU-R 385
8 GHz	EN 300 234, ITU-R 386
11 GHz	EN 300 234
13 GHz	EN 300 234
15 GHz	EN 300 234
18 GHz	EN 300 430, CEPT T/R12-03, ITU-R F.595-5
23 GHz	EN 300 198, BAPT 211 ZV 02/23, MPT 1409, CEPT T/R13-02, ITU-R REC. F.637-2
26 GHz	EN 300 431, BAPT 211 ZV 11/26, MPT 1420, CEPT T/R13-02, ITU-R REC.748-2
28 GHz	EN 300 431, CEPT T/R13-02, ITU-R REC.748
32 GHz	EN 300 197, ITU-R REC. 746
38 GHz	EN 300 197, BAPT 211 ZV 12/38, MPT 1714, CEPT T/R12-01, ITU-R REC.749

Radio

155 Mbps, 16/128 QAM, Single Carrier

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Transmit Power * 16 QAM/128 QAM	-/26 dBm	-/24 dBm	-/20 dBm	-/18 dBm	-/18 dBm	20/17 dBm
Tx Attenuation Range 16 QAM/128 QAM	-/25 dB	-/25 dB	-/25 dB	-/25 dB	-/25 dB	30/25 dB
Receiver Sensitivity (BER=10^{-6}) 16 QAM/128 QAM	-/-68 dBm	-/-68 dBm	-/-68 dBm	-/-68 dBm	-/-68 dBm	-75/-68 dBm

23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
Transmit Power * 16 QAM/128 QAM	20/17 dBm	20/17 dBm	20/17 dBm **	17/15 dBm	15/15 dBm
Tx Attenuation Range 16 QAM/128 QAM	30/25 dB	30/25 dB	30/25 dB	30/25 dB	30/25 dB
Receiver Sensitivity (BER=10^{-6}) 16 QAM/128 QAM	-74/-67 dBm	-74/-67 dBm	-74/-67 dBm **	-72/-67 dBm	-72/-66 dBm

All Frequencies

Receiver Overload (BER=10^{-6})	Better than -15 dBm for 16 QAM and -20 dBm for 128 QAM
Unfaded BER	Less than 10^{-13}

* *Transmit power must not be set to any value higher than that specified in the tables.*

** *For LMDS B channel, power is 14 dBm and the receiver sensitivity level is -62 dBm.*

311 Mbps, 128/256 QAM, Single Carrier

18-38 GHz

Specification	18 GHz	23 GHz	26 GHz	28 GHz	38 GHz
Transmit Power * 128 QAM/256 QAM	17/- dBm	17/17 dBm	17/- dBm	17/17 dBm **	17/15 dBm
Tx Attenuation Range 128/256 QAM	25 dB	25 dB	25 dB	25 dB	25 dB
Receiver Sensitivity (BER=10^{-6}) 128 QAM/256 QAM	-65/- dBm	-64/-61 dBm	-64/- dBm	-64/-61 dBm **	-63/-60 dBm

All Frequencies

Receiver Overload (BER=10^{-6})	Better than -20 dBm
Unfaded BER	Less than 10^{-13}

** Transmit power must not be set to any value higher than that specified in the tables.*

*** For LMDS B channel, power is 14 dBm and the receiver sensitivity level is -62 dBm.*

116 Mbps, 32 QAM, Single Carrier

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Transmit Power * 32 QAM	26 dBm	26 dBm	20 dBm	20 dBm	20 dBm	20 dBm
Tx Attenuation Range 32 QAM	30 dB	30 dB	30 dB	30 dB	30 dB	30 dB
Receiver Sensitivity (BER=10^{-6}) 32 QAM	-74 dBm	-74 dBm	-74 dBm	-74 dBm	-74 dBm	-74 dBm

23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
Transmit Power * 32 QAM	20 dBm	20 dBm	20 dBm **	-	15 dBm
Tx Attenuation Range 32 QAM	30 dB	30 dB	30 dB	30 dB	30 dB
Receiver Sensitivity (BER=10^{-6}) 32 QAM	-73 dBm	-73 dBm	-73 dBm **	-	-72 dBm

All Frequencies

Receiver Overload (BER=10^{-6})	Better than -20 dBm
Unfaded BER	Less than 10^{-13}

** Transmit power must not be set to any value higher than that specified in the tables.*

*** For LMDS B channel, power is 14 dBm and the receiver sensitivity level is -62 dBm.*

Antenna

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
1 Ft Gain	--	--	--	29.2 dBi	31.9 dBi	33.5 dBi
2 Ft Gain	--	30.1 dBi	--	35.5 dBi	36.6 dBi	38.5 dBi
3 Ft Gain	--	--	--	37.8 dBi	38.9 dBi	42 dBi
4/6 Ft Gain	39.3 dBi	36.4 / 40.2 dBi	40.5/43.6 dBi	41.5/45 dBi	42.6/46 dBi	44.5/48 dBi
8 Ft Gain	41.9 dBi	42.9 dBi	--	--	--	--
10 Ft Gain	43.3 dBi	44.8 dBi	--	--	--	--
12 Ft Gain	45.2 dBi	46.3 dBi	--	--	--	--
15 Ft Gain	46.9 dBi	48.2 dBi	--	--	--	--

23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
1 Ft Gain	35 dBi	36 dBi	36.6 dBi	37 dBi	39 dBi
2 Ft Gain	40 dBi	41 dBi	41.5 dBi	42 dBi	44 dBi
3 Ft Gain	43.5 dBi	44.5 dBi	--	--	--
4/6 Ft Gain	46/49.5 dBi	47/- dBi	--	--	--

All Frequencies

Polarization	Vertical or Horizontal
Standard Mounting OD Pole	48 mm-114 mm/1.9”-4.5” (subject to vendor and antenna size)
High Performance	ETSI class 2, 3

Media Device (Antenna Mount) Losses

Installation Type					Losses (dB)			
Configuration		Mediation Device	Antenna	Path	6.8GHz	11GHz	13.15GHz	18.38GHz
STM1	Direct Mount	Ceragon Interface	Single Polarization - Ceragon Interface	-	N/A	0.4	0.8	1
STM1	Remote Mount	SORAM	Single Polarization - Standard Interface	-	1	1.4	3.2	4
STM1	Protected - Direct	POSAM	Single Polarization - Ceragon Interface	Main-Main	N/A	N/A	4	4.4
				Main-Secondary Secondary-Main	N/A	N/A	8.9	9.3
				Secondary-Secondary	N/A	N/A	13.8	14.2
STM1	Protected - Remote	PORAM	Single Polarization - Standard Interface	Main-Main	4.2	4.6	6.4	7.4
				Main-Secondary Secondary-Main	9.6	10	11.3	12.3
				Secondary-Secondary	15	15.8	16.2	17.2
STM2	Direct Mount	1/2 QOSAM	Single Polarization - Ceragon Interface	-	N/A	N/A	8.9	8
STM2	Remote Mount	1/2 QORAM	Single Polarization - Standard Interface	-	9.6	10	11.3	11
STM4	Remote Mount	QORAM	Dual Polarization - Standard Interface	-	9.6	10	11.3	11
Dual Pole	Direct Mount	DOSAM	Dual Polarization - Ceragon Interface	-	N/A	N/A	1.1	1.3
Dual Pole	Remote Mount	DORAM/2*SORAM	Dual Polarization - Standard Interface	-	1	1.4	3.2	4
Frequency Diversity		Circulator	Single Polarization - Standard Interface	F1-F1	2.1	N/A	N/A	N/A
				F2-F2	2.6	N/A	N/A	N/A

Note: The numbers above are typical losses per link.

Item	Loss (dB)			
	6-8 GHz	11 GHz	13-15 GHz	18-38 GHz
Flex twist	0.5	0.5	1.2	1.5
Coupler Main	1.6	1.6	1.6	1.7
Coupler Secondary	6.5	6.5	6.5	6.6
Tube	NA	0.2	0.4	0.5
Magic T	NA	NA	NA	3.5
Circulator	0.2	NA	NA	NA

Note: The numbers above are typical losses per component.

Payload

100-622.02 Mbps Main Channel

Payload Types	SONET: OC-3/STS-3, OC-3C/STS-3C SDH: STM-1 ATM: ATM over SONET/SDH IP: Ethernet TDM: E3, DS3, E1, T1
Interface Modules	STM-1/OC-3: Electrical - CMI/BNC, Optical - SM/MM Fast Ethernet: 100BaseTx/Fx TDM: E3, 2xE3, DS3, 2xDS3, 8xE1, 8xT1, 2xFE
Common Interface Combinations	Fast Ethernet + E3/DS3, 2xFast Ethernet, Fast Ethernet + 8xE1/8xT1, 3xE3/DS3, 2xE3/DS3+8xE1
Compatible Standards	ITU-T G.703, G.707, G.783, G.823, G.957, G.958, ITU-T I.432, ATM Forum, ETSI ETS 300 147, ETS 300 417, ANSI T1.105, ANSI T1.102-1993, Bellcore GR-253-core, TR-NWT-000499

1544/2048 Kbps Wayside Channel *

Available Interfaces	T1, E1, Ethernet bridge 10BaseT, V.35, X.21, RS-530 or V.36

***** *The Wayside channel is not available for FibeAir 1500A/1528A.*

ADM (FibeAir 1500A/1528A)

ADM Interfaces	Aggregate Interfaces: STM-1 Optical: Single/multi mode - SC type, RF - N type Tributary Interfaces: STM-1 optical, E1 120 ohm balanced, 75 ohm unbalanced using adapter panel to BT-43/BNC
ADM Configurations	Single: Aggregates - 1 optical and 1 radio, 2 optical Tributaries - 1-16xE1, STM-1 Single with Regenerator: Aggregates - 2 optical or 2 radio Tributaries - 1-16xE1, STM-1 Double: Aggregates - 2 optical or 2 radio Tributaries - 1-32xE1, 2xSTM-1
ADM Protection	Protection Method: - SNCP ring protection - MSP 1+1 for trib STM-1 Synchronization: external inputs/outputs - 2 Mbps, 2 MHz
Topologies	Protected Ring, Cascaded (Chain)

User Channel

User Channel	64 Kbps, RS-232

Service Channel

Engineering Order Wire	ADM CVSD audio channel (64 Kbps)

Note: *All interfaces are available as modular plug-in interface units.*

Protection

Protection Methods	1+1, HSB, space/frequency diversity, hitless/errorless switching, 2+2 HSB

Network Management, Diagnostics, Status, and Alarms

Type	SNMP, in compliance with RFC 1213, RFC 1595 (SONET MIB)
Local or Remote NMS Station	PolyView, CeraView with advanced GUI for Windows 98/2000/XP/NT or UNIX, integrated with HP OpenView
NMS Interface	Ethernet bridge 10Base-T, RS-232 (PPP, SLIP), built-in Ethernet hub
Local Configuration and Monitoring	Standard ASCII terminal, serial RS-232
In-Band Management	Uses standard embedded communications channel, dual port built-in Ethernet hub
TMN	Ceragon NMS functions are in accordance with ITU-T recommendations for TMN
External Alarms	FibeAir 1500/1528/1500A/1528A: 8 Inputs, TTL-level or contact closure to ground, 5 outputs, Form C contacts, software configurable FibeAir 1500P: 5 Inputs, TTL-level or contact closure to ground, 3 outputs, Form C contacts, software configurable
RSL Indication *****	Accurate power reading (dBm) available at IDU, ODU, and NMS
Performance Monitoring	Integral with onboard memory per ITU-TG.826

***** *The voltage at the BNC port is not accurate and should be used only as an aid.*

Environment

Operating Temperature (Guaranteed Performance)	ODU: -35°C to 55°C IDU: -5°C to 45°C
Relative Humidity	ODU: up to 100% (all weather operation) IDU: up to 95% (non-condensing)
Altitude	Up to 4,500 m (15,000 ft)

Power Input

Standard Input	-48 VDC
DC Input range	-40.5 to -72 VDC (up to -57 VDC for USA market)
Optional Input	110-220 VAC

Power Consumption

Maximum ODU Power Consumption	For 1+0: 40W For 1+1: 63W
Maximum IDU Power Consumption	*FibeAir 1500/1528/1500A/1528A:* For 1+0: 66W For 1+1: 130W *FibeAir 1500P:* For 1+0: 25W For 1+1/2+0: 40W

Mechanical

ODU	25 cm diameter x 23 cm depth (10” diameter x 9” depth) Weight: 8 kg
IDU	4.3 cm height x 43.2 cm width x 24 cm depth (1.7” x 17” x 9.4”) Weight: 3 kg
IDU-ODU Coaxial Cable *	RG-223 (100 m/300 ft), Belden 9914/RG-8 (300 m/1000 ft) or equivalent, N-type connectors (male)

***** Double-shielded cable is recommended to avoid IF interference from external transmission systems.

Chapter 3
Installation

General

This chapter explains how to install and set up the FibeAir Family system.

For best results, perform all operations in the sequence in which they are presented in this chapter.

Note: Instructions regarding ODU installation for a 6, 7, or 8 GHz FibeAir system are provided in the section *ODU Installation for FibeAir 6/7/8 GHz*, at the end of this chapter.

Unpacking Equipment

FibeAir is shipped in 5 crates. Upon delivery, make sure that the following items are included:

Two indoor units and accessories

Two outdoor units

Two antennas and pole mounts

One CD with CeraView management software (if ordered) and the User Manual.

Unpack the contents and check for damaged or missing parts. Should there be any parts that are damaged or missing, contact your local distributor.

Site Requirements

The first and most important consideration when choosing a prospective site for the ODU is that the point can provide an acceptable “line of sight” with the opposing ODU. A site with a clear, unobstructed view is required.

When considering a site, it is important to check for current and future obstacles. Possible future obstacles are: trees, new buildings, window cleaners on the roof, snow that may accumulate in front of the antenna, etc. The site should be accessible to certified personnel only.

As with any type of construction, a local permit may be required before installing an antenna. It is the owner’s responsibility to obtain any and all permits.

Additional Requirements for North America

Restricted Access Area: DC powered equipment should only be installed in a Restricted Access Area.

Installation Codes: The equipment must be installed according to country national electrical codes. For North America, equipment must be installed in accordance to the US National Electrical Code, Articles 110-16, 110-17 and 110-18, and the Canadian Electrical Code, Section 12.

Overcurrent Protection: A readily accessible Listed branch circuit overcurrent protective device, rated 15 A, must be incorporated in the building wiring.

CAUTION: This equipment is designed to permit connection between the earthed conductor of the DC supply circuit and the earthing conductor at the equipment.

Grounded Supply System: The equipment shall be connected to a properly grounded supply system. All equipment in the immediate vicinity shall be grounded the same way, and shall not be grounded elsewhere.

Local Supply System: The DC supply system is to be local, i.e. within the same premises as the equipment.

Disconnect Device: A disconnect device is not allowed in the grounded circuit between the DC supply source and the frame/grounded circuit connection.

Before Installing the ODU

WATCH FOR WIRES! Installation of this product near power lines is dangerous. For your own safety, follow these important safety rules.

Perform as many assembly functions as possible on the ground.

Watch out for overhead power lines. Check the distance to the power lines before starting installation.

Do not use metal ladders.

If you start to drop the antenna or mast assembly, move away from it and let it fall.

If any part of the antenna or mast assembly comes in contact with a power line, call your local power company. DO NOT TRY TO REMOVE IT YOURSELF! They will remove it safely.

Make sure that the mast assembly is properly grounded.

Assembling antennas on windy days can be dangerous. Because of the antenna surface, even slight winds create strong forces. Be prepared to safely handle these forces at unexpected moments.

Mediation Device Flange Specifications

The following table lists frequencies, the appropriate waveguide standard for each frequency, and their corresponding antenna/waveguide flange interfaces.

The table should be consulted when installing the ODU and antenna.

Frequency (GHz)	WaveGuide Standard	Antenna Flange Interface	WaveGuide Flange Interface
6-7	WR137	CPR137G	CPR137F
7-8	WR112	CPR112G	CPR112F
11	WR90	CPR90G	CPR90G
13	WR62	UG-541A/U	UG-419/U
15	WR62	UG-541A/U	UG-419/U
18	WR42	UG-596A/U	UG-595/U
23	WR42	UG-596A/U	UG-595/U
26	WR42	UG-596A/U	UG-595/U
28	WR28	UG-600A/U	UG-599/U
38	WR28	UG-600A/U	UG-599/U

Required Components and Equipment

Required System Components

The following FibeAir components are needed to install one radio link:

Antenna mount and accessories

Antenna

ODU

Cable

Headset

BNC headset adaptor

BNC DVM adaptor.

Required Tools and Equipment

The following tools and equipment are needed to install an ODU:

4 x N-type connectors (according to cable type)

Coaxial cable

Insulation tape

Ratchet wrench (3/8” Drive)

10 mm nut driver

13 mm socket (3/8” Drive)

13 mm open/box end wrench

Phillips screwdriver

Sharp cutting knife

Compass (optional)

Torque wrench

Digital voltmeter

SDH analyzer

PDH analyzer

Packet analyzer

CeraView PC Requirements

Before you install the CeraView software, verify that your PC has the minimum requirements as follows:

Processor:	Pentium 4, 1.2 GHz (minimum)
Memory (RAM):	128 MB minimum
Operating System:	Windows 98/2000/ME/XP/NT
Display Monitor:	800 x 600 minimum, 16,384 colors minimum
Serial Port:	RS-232 (Hyper-Terminal)
Keyboard	
Mouse	

Suggested Pole Installation

The antenna can be installed on a ground tube, roof, or wall mount. The ground tube or roof/wall mount should be assembled and in place before installing the antenna mount.

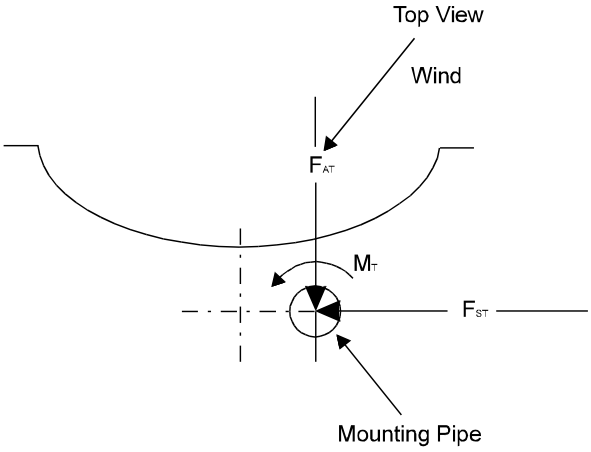


Figure 3-1 Calculating Required Pipe Diameters

Use the following table to determine the pipe diameters:

Antenna Size	1 ft (30 cm)	2-2 1/2 ft (60-75 cm)	4 ft (120 cm)	6 ft (180 cm)	8 ft (240 cm)	10 ft (300 cm)
Minimum Pipe Diameter	50 mm	65 mm	115 mm	115 mm	115 mm	115 mm
Wind Velocity	200 km/h	200 km/h	200 km/h	200 km/h	200 km/h	200 km/h
$F_{AT, max.}$ [N]	303	929	2821	6348	11284	17632
$F_{ST, max.}$ [N]	150	460	1398	2830	5590	3734
$M_{T, max.}$ [Nm]	47	283	894	2000	4901	8630

After determining the pole size, verify that you have the required bolt for the antenna mount, as shown in the following table.

Pipe Diameter (mm)	Bolt size (mm)
48-51	51
52-89	89
90-115	115

Flow of Operations

The installation and setup procedure for FibeAir consists of the following operations (to be performed in the order listed below):

CeraView Management Software:

Installing the Management Software

For Ethernet Connection: Configuring the PC's IP Address and Mask

For Serial Connection: Installing PPP/SLIP Drivers (Win98 and NT), and Configuring the Dialer

ODU and Antenna:

Installing the ODU and Antenna

Initial Antenna Alignment

IDU:

Installing and Connecting the IDU

Turning the IDU on

Connecting to the IDU using the Local Craft Terminal

Configuring the IP Address and Mask to the IDU

Setting Tx and Rx Frequencies

Setting Tx Power

Link Commissioning:

Antenna Alignment - Checking the Receive Signal Level

Connecting to the IDU using the Local Craft Terminal Management Software (via Ethernet or Serial)

Commissioning of Link

Installing the IDU in a 19" Rack

The IDU can be installed in a 19" rack (1U) using the rack mount kit.

Figure 3-2 Installing the IDU in a 19" Rack

To attach the rack mount to the IDU follow these steps:

1. Attach mount brackets to each side of the IDU, and, using the supplied screws, attach them to the holes in the IDU side panel.

2. Install the IDU unit in the 19" rack as shown in the illustration above.

3. To power on the unit, connect the WV-0001-0 cable supplied to the **DC Input** interface on the front of the IDU and connect the other side of the cable to the DC voltage supply:

   White: GND
   Green: -48V
   Brown: 0V

4. When more than one unit is installed, it is recommended to keep a gap of 1U between the units in the rack.

Important: The user power supply GND must be connected to the positive pole in the IDU power supply.

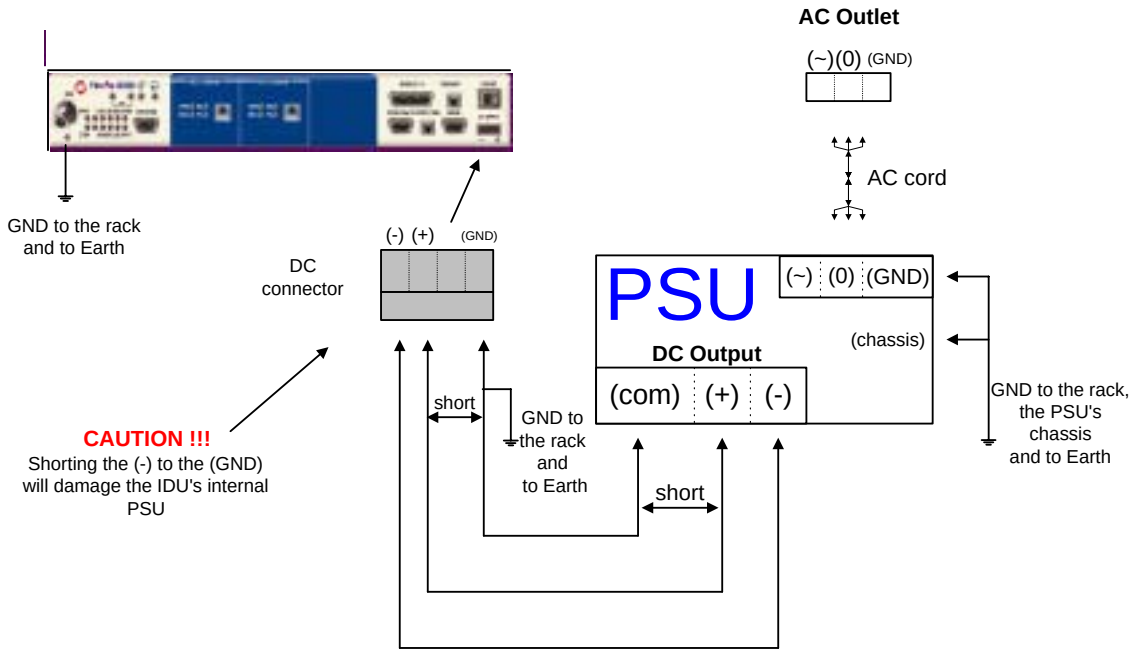
Important Power Supply Connection Notes

When selecting a power source, the following must be considered:

- DC power can be from -40.5 VDC to -72 VDC.
- ***Recommended:*** Availability of a UPS (Uninterrupted Power Source), battery backup, and emergency power generator.
- Whether or not the power source provides constant power (i.e., power is secured on weekends or is shut off frequently and consistently).

The power supply must have grounding points on the AC and DC sides.

Power supply grounding should be in accordance with the following illustration:



Please Note:

It is most important not to short the -48 VDC (-) to GND. This will damage the IDU's internal power supply module and terminate its operation.

Setting Up the IDU

IDU Power-On

1. Turn the IDU power switch to ON.

The LED display for FibeAir 1500/15281500A/1528A should appear as follows:

LED	Color	Explanation
PWR	Green	Power on
STBY	Green	Normal operation
LINE	Red	No input to main channel/High Ber
IDU	Green	IDU operating and no IDU alarm
LOF	Red	Loss of Frame detected (no radio connection)
ODU	Red	No communications to ODU
BER	Red	Excessive bit error rate detected
CBL	Red	RF cable open/short
LBK	Green	Loopback not operated
RMT	Red	Remote unit not connected

The LED display for FibeAir 1500P should appear as follows:

LED	Color	Explanation
DRWR	Green	Power on
ODU	Red	No communications to ODU
CBL	Red	RF cable open/short
LPBK	Green	Loopback not operated
RADIO	Green	Radio connected

If the LED display is not as described above, refer to *Chapter 6 - Troubleshooting & Diagnostics*.

IDU Initialization

The IDU initialization and basic configuration is performed via the **Terminal** interface on the IDU front panel using the standard Windows HyperTerminal at 19200 bits per second. The basic configuration includes setting IP addresses for the Ethernet and serial ports. These are needed for running the CeraView software.

The system configuration can be completed either by using the HyperTerminal or by using the CeraView application. The recommended way to start is by running the Quick Setup Procedure using the HyperTerminal, and continue to install the CeraView software.

Setting IP Addresses for Ethernet and Serial Ports

In addition to this section, refer to *Chapter 4 - System Setup, Setting IP Addresses for Ethernet and Serial Ports*.

FibeAir includes two IP interfaces: an Ethernet interface, and a serial interface. Each interface has its own IP address and IP mask.

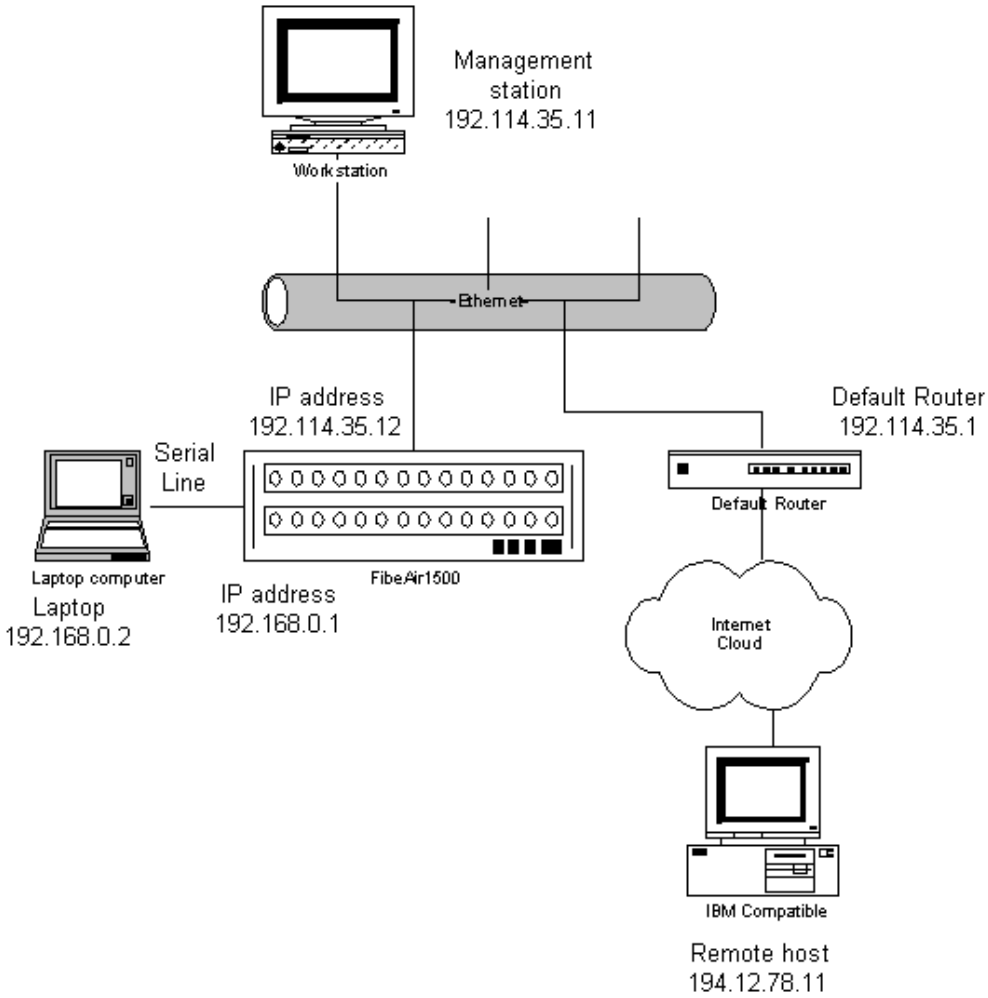
The IP address is a four digit number separated by decimal points. Each IP address is a pair netid,hostid, where *netid* identifies a network, and *hostid* identifies a host on the network. The IP mask separates between the netid and hostid.

For example, if the IP address is 192.114.35.12 (11000000 01110010 00100011 00001100), and the IP mask is 255.255.255.0 (11111111 11111111 11111111 00000000), the netid is 192.114.35, and the hostid is 12.

An IP interface can only communicate with hosts that are on the same net (have the same netid). In the example above, the interface can communicate only with hosts that have netid 192.114.35 (for 1 to 255).

If FibeAir has a frame to send to a host that is not on the Ethernet IP netid or the serial IP netid, the frame sould be sent to an intelligent device (usually a gateway) on the network. Such a device, known as a "default router", will know how to send the frame over the internet. The default gateway should be a host on one of the FibeAir interface *netid*s.

The following figure shows how FibeAir is integrated in the local network.



Installing CeraView Management Software

1. Insert the CeraView CD in the CD drive.
2. Via Windows Explorer or the File Manager, double-click the setup.exe file.

   The installation program begins installation.
3. Follow the instructions displayed.

SLIP/PPP driver installation is provided in Appendix A.

Connecting to the Ethernet Port

Connect a crossed Ethernet cable from your PC to the Ethernet Port. If the connection is to a LAN (wall connection) use the standard Ethernet cable.

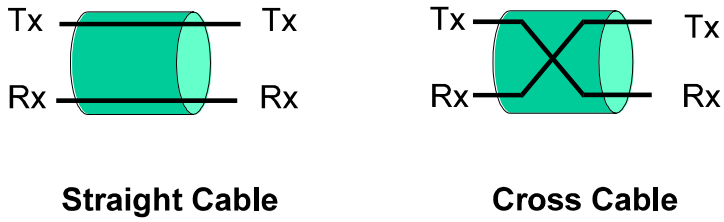


Figure 3-3 Crossed and Straight Cable

2. Make sure the IP address on your PC is on the same sub-net as you defined in the FibeAir indoor unit (i.e. in most cases, the first three numbers of the IP address must be identical, depending on the sub-net mask).
3. Run the CeraView software from your computer.

Connecting to a PPP/SLIP Port

Remove the IDU cable from the TERMINAL port and connect it to the SERIAL port (RS-232).

Installing a PPP/SLIP Driver

Install a PPP/SLIP driver in your computer.

Refer to Appendix A for details of installation in Windows 98/2000/NT.

The installation of the PPP/SLIP driver is needed only for the first time that you operate the computer.

Setting the Baud Rate (for serial connections)

1. Double-click on the **My Computer** icon of the Windows Program Manager.

   The **My Computer** window is displayed.
2. Double-click on Dial-Up Networking.

The Dial-Up Networking window is displayed.

3. On the icon, which was added after performing the steps detailed in *Appendix A. SLIP Driver Installation*, click the right mouse button and select the Properties option.

   The Properties window is displayed.

4. In the Connect Using section of the Properties window, click on **Direct Connection** and click on the **Configure** push-button.

   The Configure window is displayed.

5. Select the **General** tab.

   The General window is displayed.

6. Set the Maximum Speed to 19,200.

7. Click **OK**.

   The Configure window is closed.

Connecting to the IDU via Serial Port

1. Double-click on the icon which was added after performing the steps detailed in Appendix A (My Computer➢Dial-up Networking).

   The **Connect To** window appears.

Figure 3-4 Connect To Window

2. Click **Connect**.

   The Terminal Screen window appears.

Figure 3-5 Terminal Screen Window

3. Click **Continue**.

   The Connected To window appears.

4. Select **Start ➢ Programs ➢ CeraView**.

   The CeraView Login window appears.

Figure 3-6 CeraView Login Window

5. Enter the information and click **OK**.

   Mark the **Save Password** box if you want CeraView to remember the password you entered.

   Note that there are two types of passwords, each with a different security level for authorized activities:

   Read Only - user is permitted to perform monitoring activities only.

   Read/Write - user is permitted to change system configuration and system administrator parameters, and perform monitoring activities.

Setting the Local Tx Frequency Channel

If the Tx frequency was previously defined using the Hyperterminal, use this screen only to verify that the correct frequency was set.

1. Select **Configuration ➢ Local/Remote ➢ ODU**.

The ODU Configuration window is displayed.

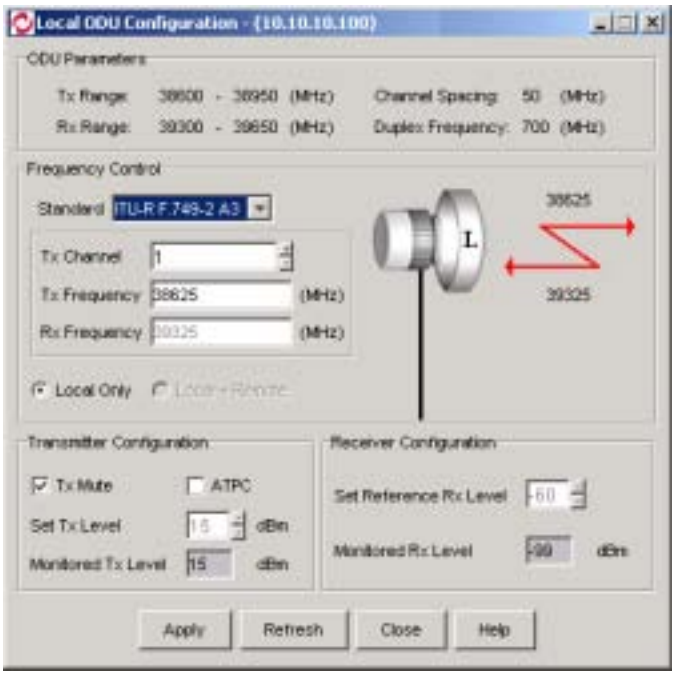


Figure 3-7 ODU Configuration Window

At the top of the window, the system displays Tx/Rx ranges, the gap between them according to the ETSI standard, and the channel bandwidth.

2. In the Frequency Control section, set the Tx Channel to the required channel. By default it is set to the first channel. If you are unsure of the required channel, refer to Appendix E for ETSI channel allocations. The frequency of the selected Tx channel appears in the Tx Frequency field.

3. If you prefer, you may set the Tx frequency by entering a frequency in MHz in the Tx Frequency section. If the frequency is not available, a warning message appears to enable the entered frequency or to change it to the next available channel.

4. For FibeAir 1500P, select the XPIC option (which appears under the ODU illustration) to activate the XPIC mechanism. The mechanism is used to cancel cross polar interference in a dual polarization system.

5. Select the Local Only option. By default, the Local + Remote option is selected. However, since there is no connection to the remote unit at this time, the Local + Remote option is not available.

6. Click **Apply** to save the settings.

7. Click **Close**.

Exiting CeraView

1. In the Main window, select **File ➢ Exit** to exit the Management software.
2. Turn off the IDU.

The following sections describe the installation procedures for 1 foot and 2 foot antennas which are the most frequently used. For procedures on installing other antennas, see the Antenna Information appendix.

Installing the Antenna

This section details the 1 ft (RFS) antenna assembly. For other antenna sizes and manufacturers, please refer to the antenna assembly instructions provided with each antenna shipped from Ceragon.

For site requirements and pole installation, see the beginning of this chapter.

General

The following figure shows a one foot antenna mounted on a pole.

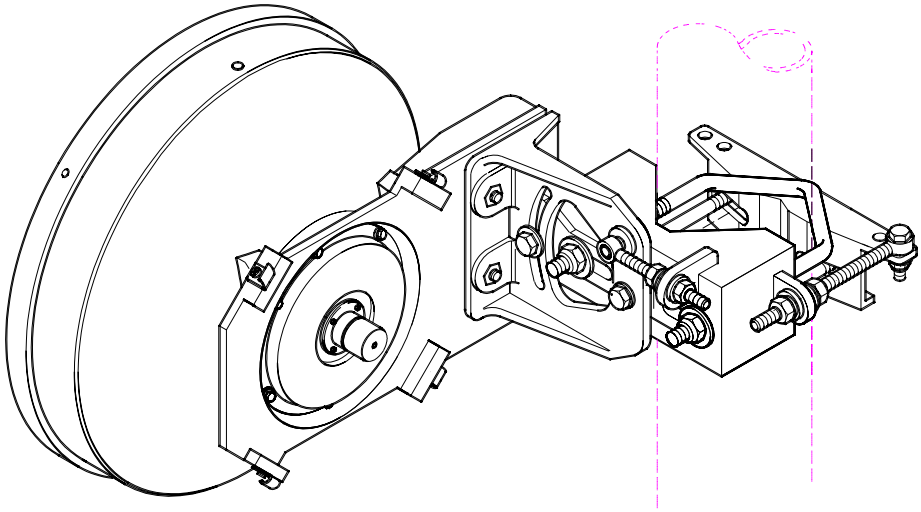


Figure 3-8 A Mounted One Foot Antenna

Installation Instructions

Warning

It is important to mount the antenna exactly as described in this installation instruction. Ceragon Networks disclaims any responsibility for the result of improper or unsafe installation. These installation instructions have been written for qualified, skilled personnel.

Refer to the following figure while performing the installation.

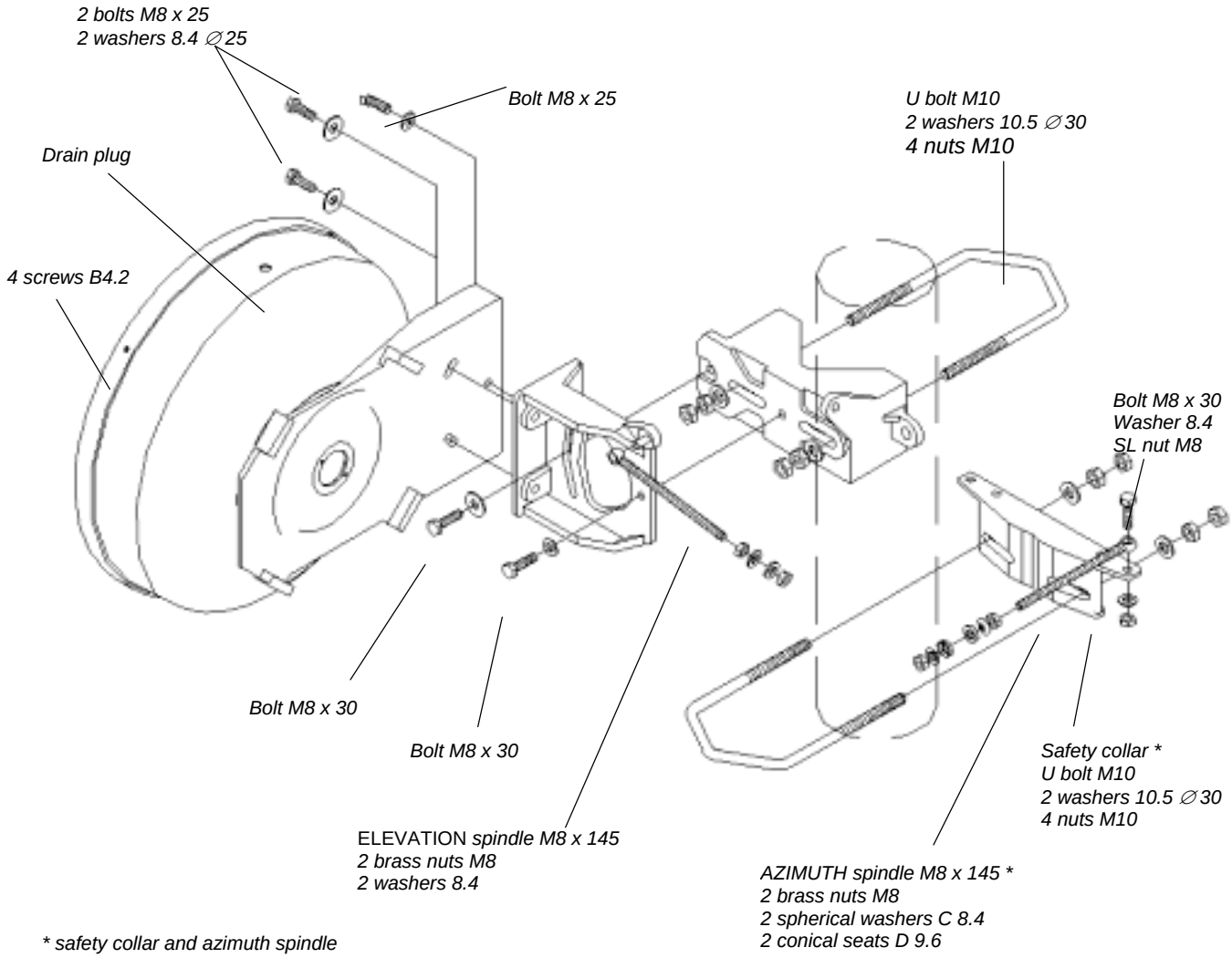


Figure 3-9 Antenna Assembly - One Foot Antenna

1. Place U bolt **(A)** and safety collar **(B)** around the pole at the desired height, connect them and tighten in place at a 90° angle to the opposing site direction.

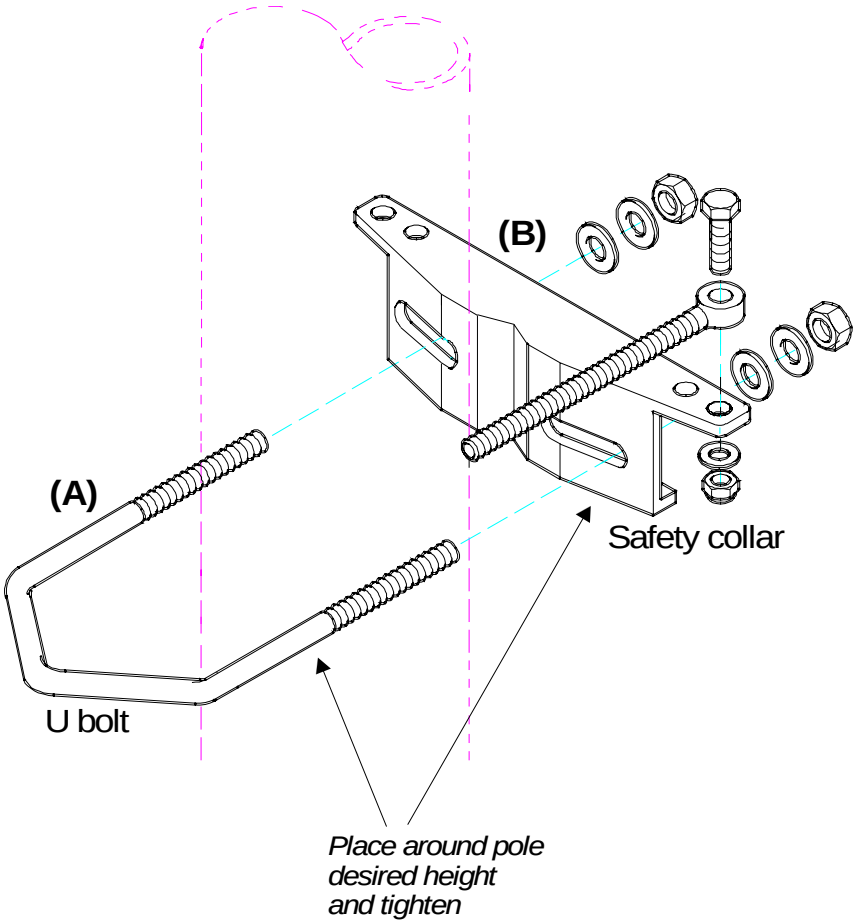


Figure 3-10 Antenna Assembly (cont.)

Note *The safety collar assembly shown in Figure 3-14 above (**(A)** and **(B)**) is used to align and support the antenna mount during installation and antenna alignment. Once the mount is in place and alignment is completed, all bolted joints of the antenna mount are tightened and there is no further need for the support provided by the safety collar assembly. It may then be removed for use in future installations.*

2. Connect **(C)** to **(D)** at the approximate elevation needed to face the opposing ODU (determined by the bolts fastened to part **(C)**).

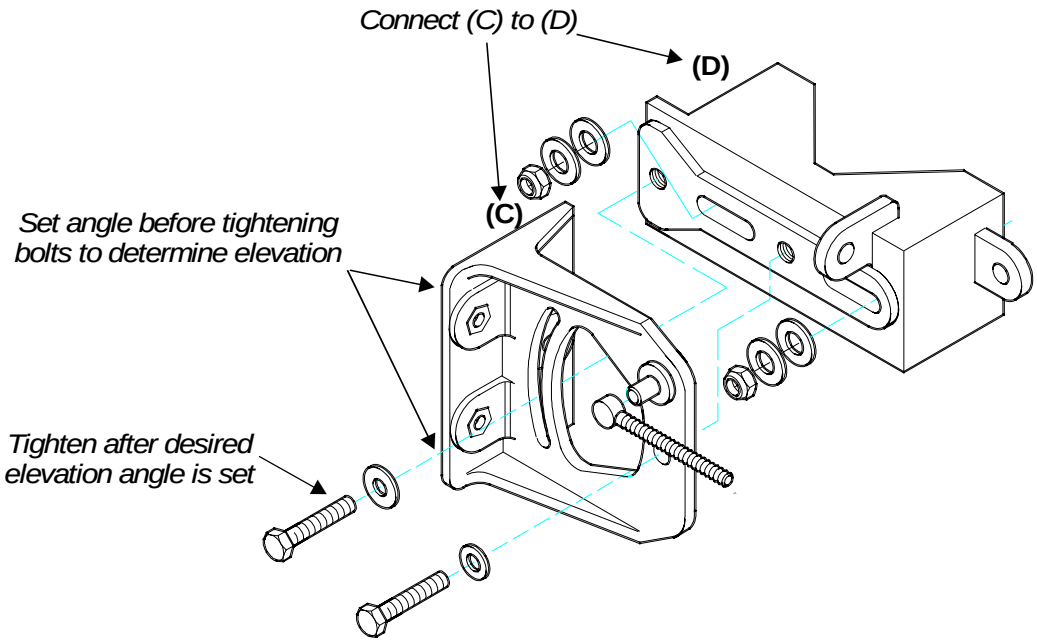

Connect (C) to (D)
(D)
(C)
Set angle before tightening bolts to determine elevation
Tighten after desired elevation angle is set

Figure 3-11 Antenna Assembly (cont.)

3. Place the assembly constructed above (**(C)** and **(D)**) and U bolt **(E)** around the pole on the safety assembly (attached in Step 1) and connect the two. Before doing this, make sure that the elevation spindle **(F)** is in hole **(G)** and loosen the screws on both sides to grant freedom of movement.

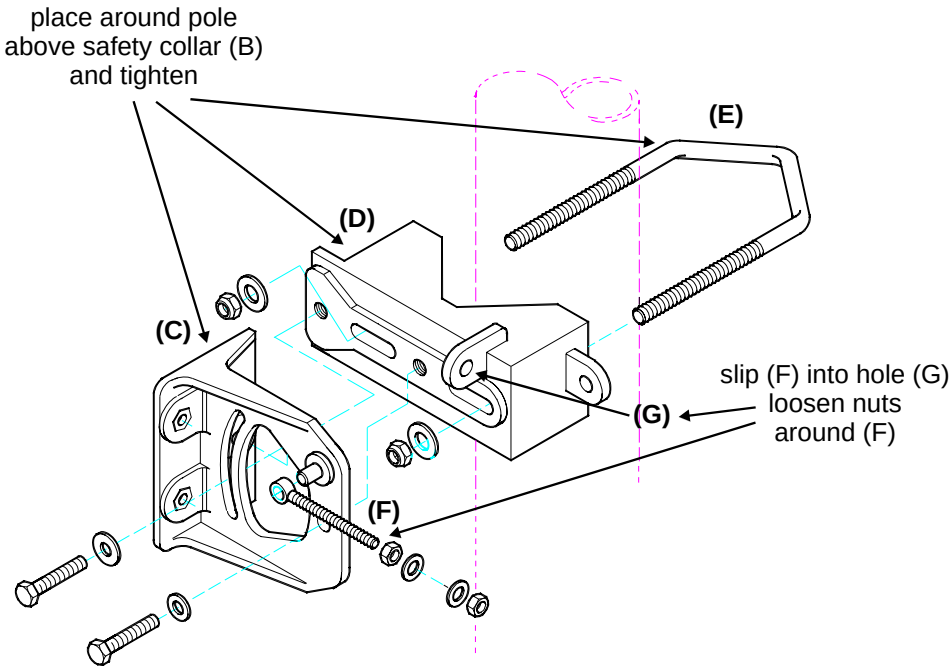


Figure 3-12 Antenna Assembly (cont.)

Following step 3 the assembly should be as illustrated in the follwing figure.

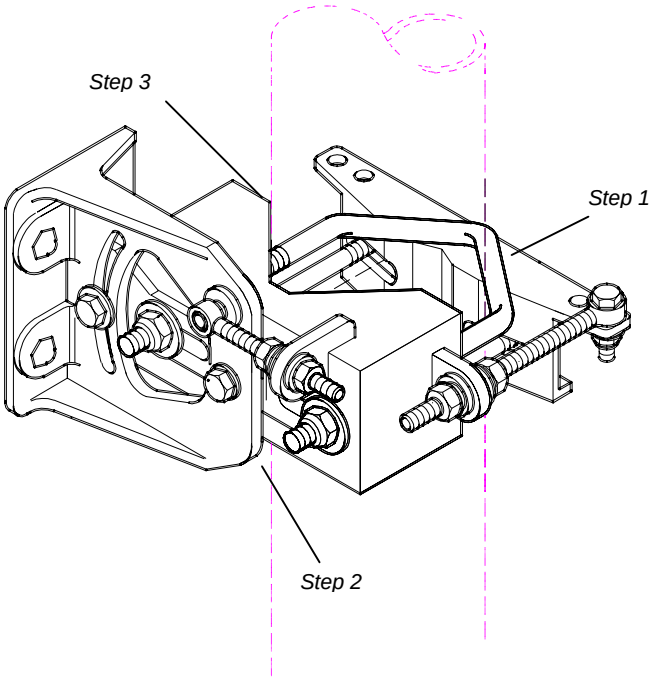


Figure 3-13 Antenna Assembly (cont.)

4. Attach the antenna **(H)** to the antenna mount **(I)**.

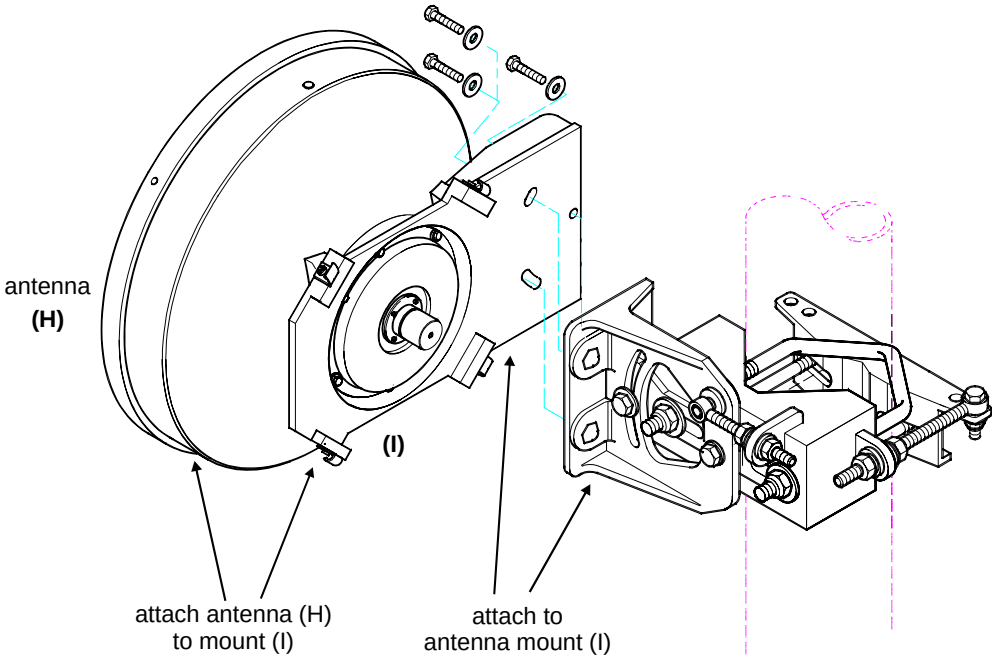


Figure 3-14 Antenna Assembly (cont.)

Make sure to install the antenna with the drain plug side up as shown in the following figure.

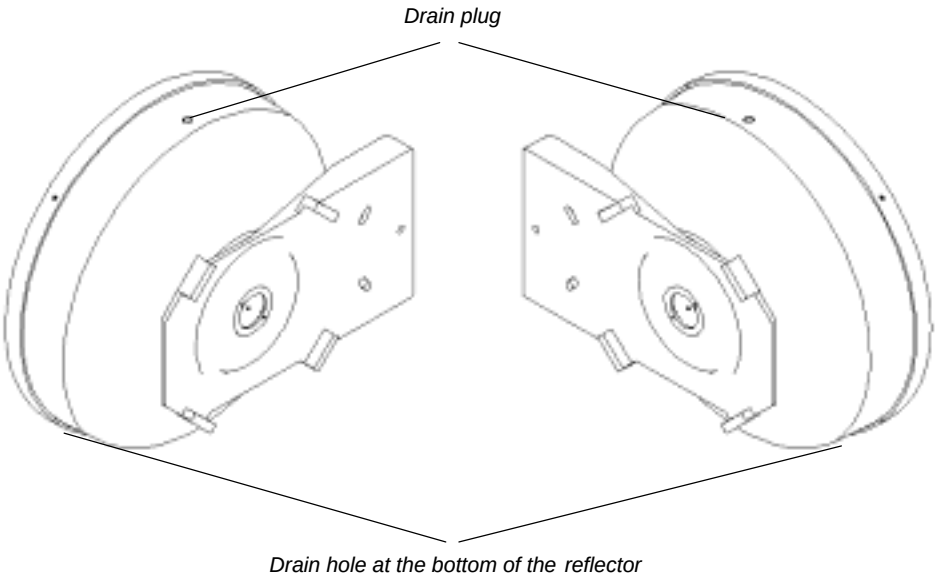


Figure 3-15 Correct Orientation of Antenna

5. Mount the optical viewfinder on the antenna (optional). Locate the opposite site through the viewfinder and loosely tighten the bolts.

6. Roughly align the antenna with the opposing site. This can be done using compass bearings or visually.

Tip *It is sometimes difficult to identify the opposing site. For this reason, it is sometimes helpful to have someone at the opposing site use a reflecting device, such as a hand-held mirror, to reflect sunshine towards you. The optical viewfinder can help in initial antenna alignment.*

7. Insert the azimuth spindle **(J)** into hole **(K)** and tighten in place.

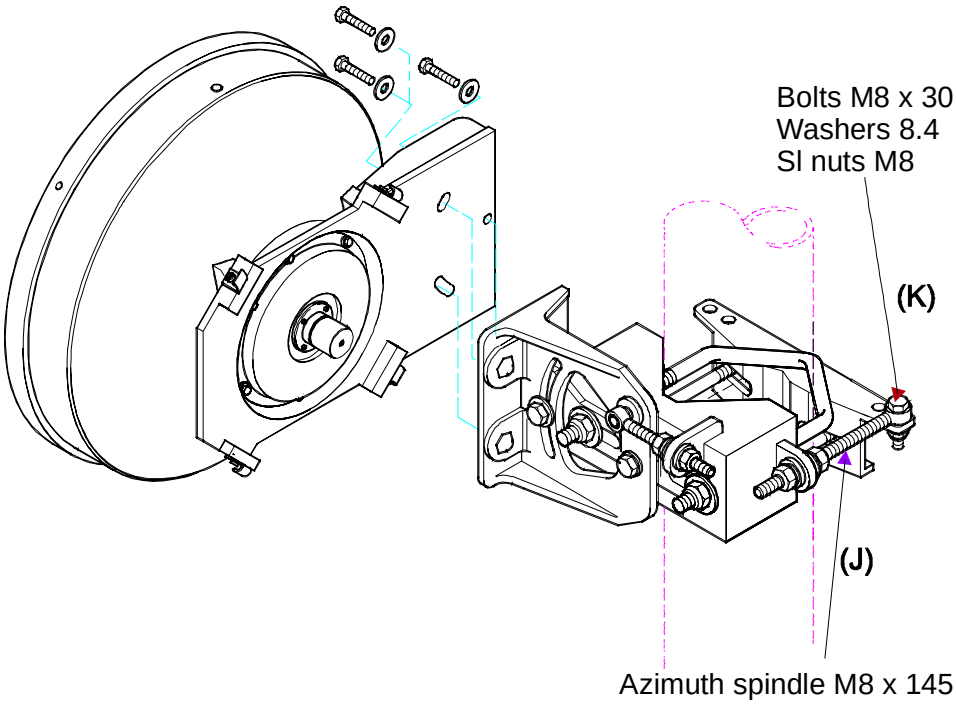


Figure 3-16 Antenna Assembly (cont.)

8. Attach the ODU to the mount assembly using the four latches on the ODU **(L)**. See the following figure.

Warning

To verify proper sealing, confirm existence of a rubber O-ring on the antenna, as shown in the following figure.

Setting Polarization

Polarization is determined by the orientation of the ODU. If the handle of the ODU is facing up or down then the polarity is vertical. If the handle of the ODU is to the side then the polarization is horizontal.

Tip *For easy installation and best weather immunity, mount the ODU so that the connectors are facing down.*

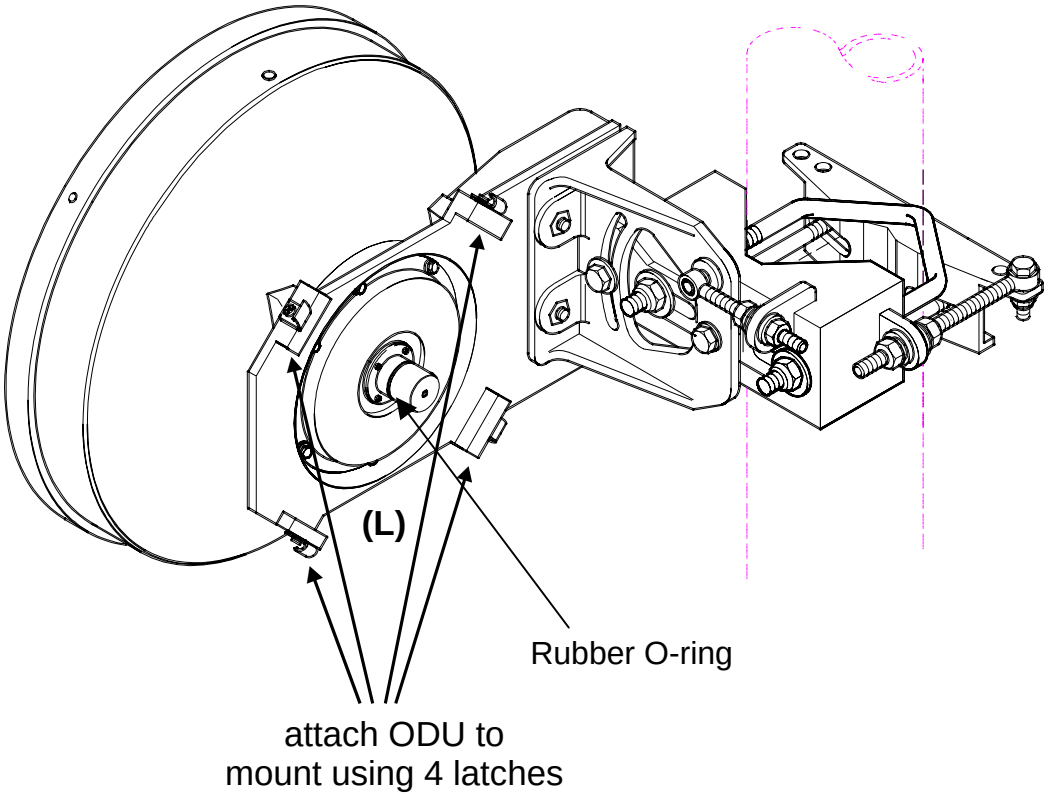


Figure 3-17 Antenna Assembly (cont.)

9. Connect the coaxial cable between the IDU and ODU using the N-Type connector on the IDU and the ODU.

10. Make sure that the fittings and the coax cable are clean and dry.

11. Peel approximately 6 inches of COAX-SEAL from the paper backing.

12. Wrap isolation tape over the coax cover. Start winding from coax cover towards fitting with one half overlap with each winding making sure all joints are well covered.

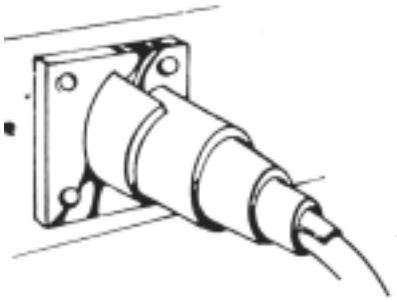


Figure 3-18 Steps 1, 2 & 3

13. After entire fitting and coax cable are covered with approximately 3/16" thick layers, mold and form COAX-SEAL with fingers to make a smooth surface and force out any air.

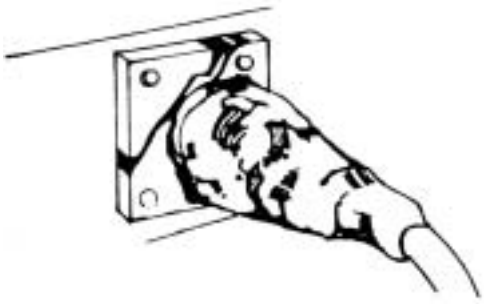


Figure 3- 19 Step 4

14. If more COAX-SEAL is necessary to complete seal, simply cut the needed amount and add to existing COAX-SEAL, molding and press into the other material. COAX-SEAL adheres to itself with slight pressure.

    Carefully inspect seal to make certain that all joints are covered

Tip *Connect and disconnect the IDU from the ODU only when power is off.*

15. Turn the IDU power switch to ON.

    The LED display for FibeAir 1500/1528/1500A/1528A should appear as described below to indicate normal operation.

LED	Color	Explanation
PWR	Green	Power on
STBY	Green	Normal operation
LINE	Red	No input to main channel/High Ber
IDU	Green	IDU operating and no IDU alarm
LOF	Red	Loss of Frame detected (no radio connection)
ODU	Yellow	Rx/Tx out of range
BER	Red	Excessive bit errors detected
CBL	Green	Cable between IDU and ODU properly connected
LBK	Green	Loopback not operated
RMT	Red	Remote unit not connected

The LED display for FibeAir 1500P should appear as described below to indicate normal operation.

LED	Color	Explanation
DRWR	Green	Power on
ODU	Red	No communications to ODU
CBL	Green	Cable between IDU and ODU properly connected
LPBK	Green	Loopback not operated
RADIO	Green	Radio connected

If the LED display is not as described above, refer to *Chapter 6 Troubleshooting & Diagnostics*.

Initial Antenna Alignment using the Headset

Connect the headset BNC adapter to the ODU.

Connect the headset to the adapter and put it on.

If a tone is heard, your initial alignment is OK. Now you can adjust the aim to find the highest tone pitch and proceed to the final alignment below.

If no tone is heard, the initial alignment is not satisfactory.

It is recommended to use the optical viewfinder for initial alignment. In this case, loosen the azimuth bolts, adjust azimuth and tighten in the position where the highest tone is heard. If this does not help, adjust elevation and then azimuth. See directions below.

Tip *We recommend that two people perform this installation and alignment procedure, one at each ODU site, with some method of communications between them.*

Azimuth Alignment

Loosen the nuts shown in the following figure and rotate the antenna and mount, pointing it to the location of the opposing antenna.

Slowly sweep the antenna in azimuth using the azimuth adjustment nuts.

If the desired signal is not found, increase or decrease elevation setting and repeat the azimuth sweep.

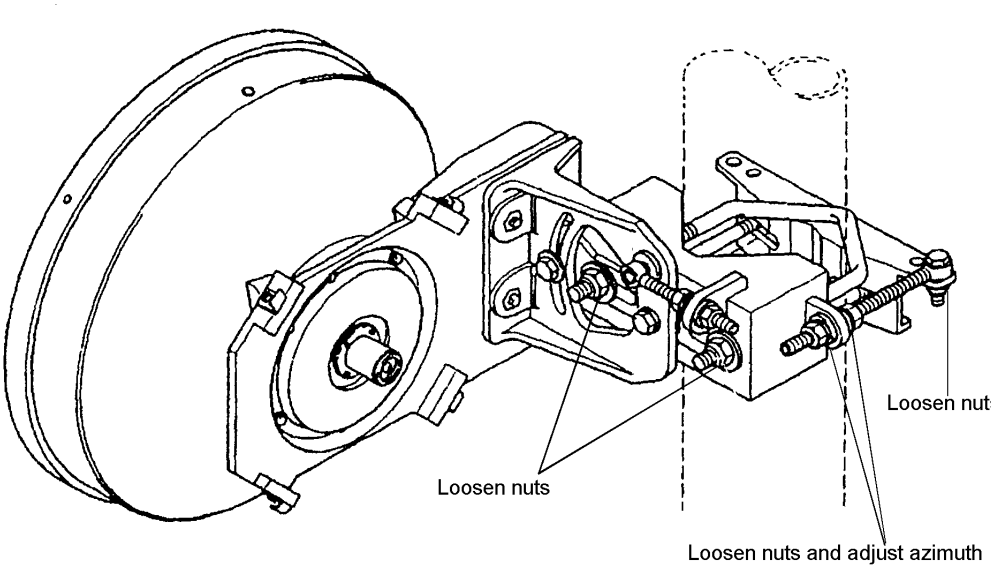


Figure 3-20 Adjusting Azimuth - One Foot Antenna (with safety collar)

Elevation Alignment

Loosen elevation adjustment bolts and nuts to adjust elevation (refer to the following figure).

Align pointer or edge of clamp with appropriate mark at the desired elevation reading.

Make an approximate setting. Temporarily tighten elevation bracket nuts.

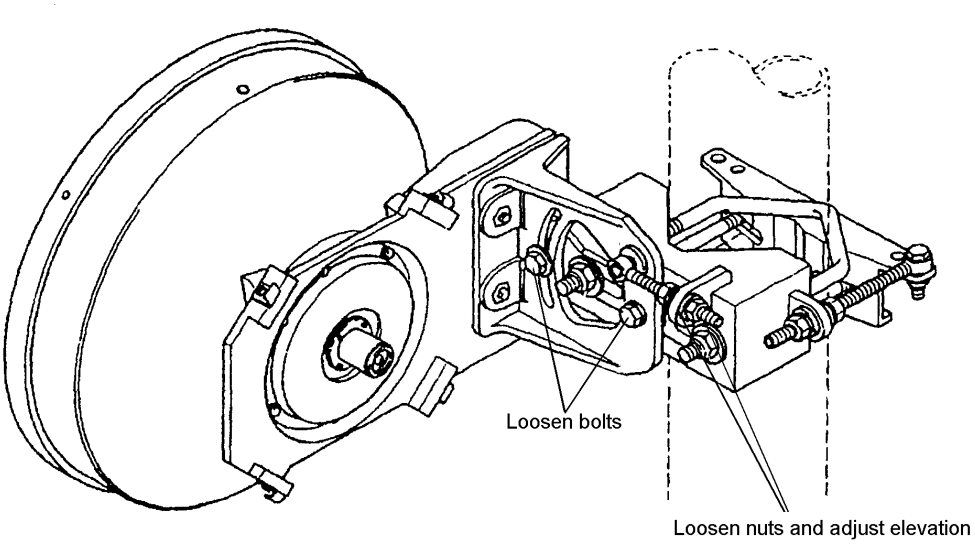


Figure 3-21 Adjusting Elevation - One Foot Antenna

16. Once you attain the highest audible tone, disconnect the BNC headset adapter.

This completes initial alignment of the system.

Alignment Verification (checking actual receive level)

When pivoting the antenna ±2° in azimuth and elevation during antenna alignment, three distinct lobes are probable: the two side lobes and the center (main) lobe. To ensure optimum system performance, the center lobe of the antenna must be aligned with the center of the opposing antenna in the link.

The initial alignment procedure explained in the previous section allows you to align the system to the peak of a lobe. However, it is difficult to make sure that the system is aligned to the center lobe using the tone heard through the headset. Therefore, following the initial alignment procedure you must perform the final alignment verification explained below in order to make sure that the system is aligned to the center lobe by verifying that the actual received signal level corresponds to the expected receive signal level. When the antenna is aligned to a side lobe, the expected RSL is at least 25dB less than the calculated unfaded RSL.

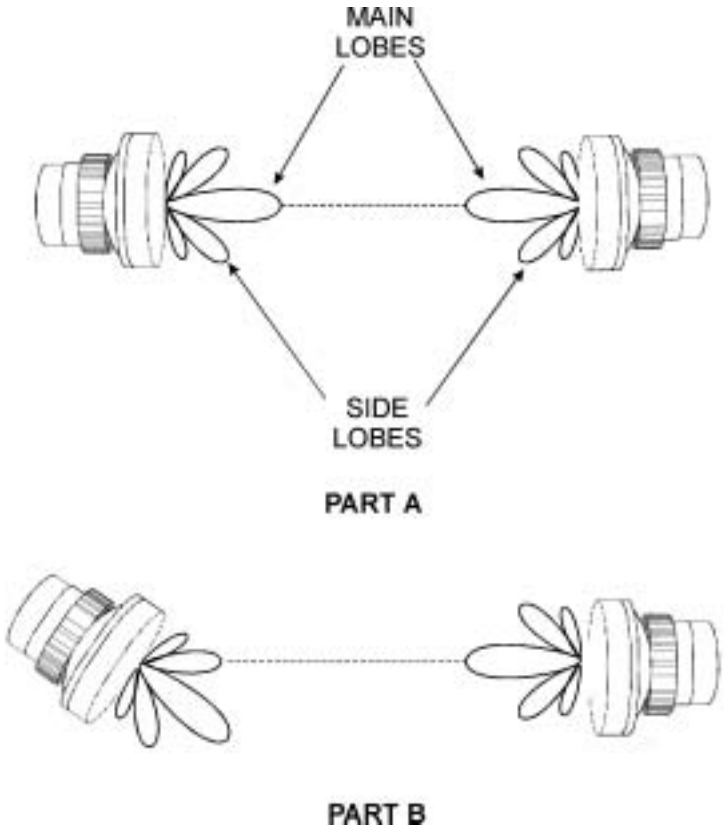


Figure 3-22 Antenna Alignment – Main and Side Lobes

1. Connect a DVM (Digital Voltmeter) - BNC adapter to the ODU.
2. Set the DVM to 2 VDC.
3. Turn the DVM on.

   The reading on the DVM indicates receive signal level.

   For example, if -1.44V is displayed, receive signal level is -44 dBm.
4. Compare the value displayed on the DVM to the expected value.
5. If the received signal level is within +/-4 dB of the expected calculated level, tighten all bolted joints and remove the safety assembly.

Important

It is important to verify that the antenna is aligned to the center lobe peak. Proper alignment reduces the sensitivity to antenna movement, which can be due to strong winds or any other forces.

Final Check

When the antenna is installed, make sure that all aspects of the installation instructions have been followed. Check that all bolted joints are tightly locked, and connect and cover the coax cable connector as follows:

1. Connect the coaxial cable between the IDU and ODU using the N-Type connector on the IDU and the ODU.

2. Make sure that the fittings and the coax cable are clean and dry.

3. Peel approximately 6 inches of COAX-SEAL from the paper backing.

4. Wrap isolation tape over the coax cover. Start winding from coax cover towards fitting with one half overlap with each winding making sure all joints are well covered.

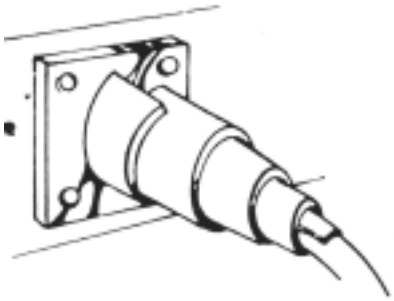


Figure 3-23 Steps 1, 2, and 3

5. After entire fitting and coax cable are covered with approximately 3/16" thick layers, mold and form COAX-SEAL with fingers to make a smooth surface and force out any air.

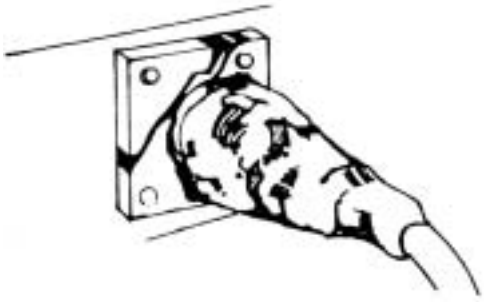


Figure 3-24 Step 4

6. If more COAX-SEAL is necessary to complete seal simply cut the needed amount and add to existing COAX-SEAL, molding and press into the other material. COAX-SEAL adheres to itself with slight pressure.

   Carefully inspect seal to make certain that all joints are covered

Safety and Grounding

The pole, antenna mount assembly and feed cables must be grounded in accordance with current national and local electric codes to protect from surges due to nearby lightning strikes. The following figure illustrates a typical grounding method.

Clamps that provide a solid connection between ground wire and ground source should be used.

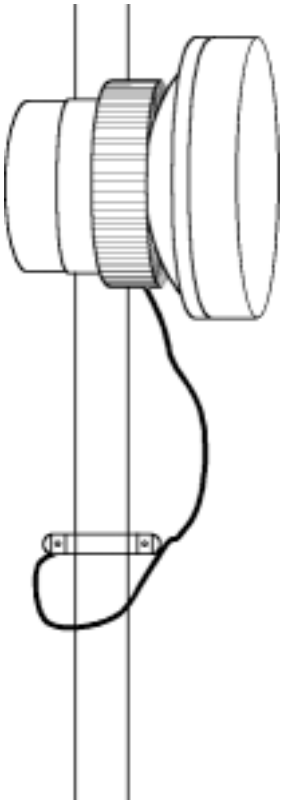


Figure 3-25 Grounding the ODU Assembly

The ODU installation and initial alignment is now complete. Repeat this procedure for the opposing ODU.

Installation Verification

Using the Headset and Buzzer

Connect a headset to the headset connector on the IDU (both sides), verify communications and test the buzzer (also on IDU front panel). Note that to use the headset, the Engineering Order Wire option must be set to active. The Engineering Order Wire is an audio connection between the two indoor units.

Verifying Activation of Engineering Order Wire (EOW)

To verify that the Engineering Order Wire (EOW) option is activated, follow these steps:

1. Select **Configuration**, **Local**, **IDU**, **Auxiliary Channel**.

   The Auxiliary Channel Configuration window appears.

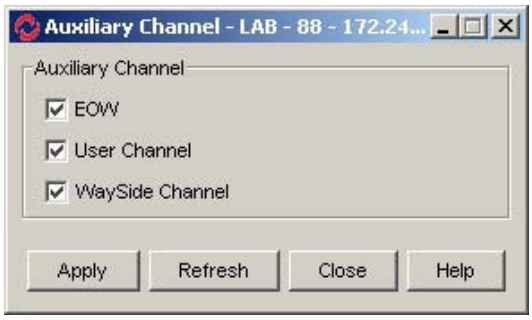


Figure 3-26 Auxiliary Channel Configuration Window

2. Mark the **EOW** option.
3. Click **Apply** to save the changes.
4. Click **Close**.
5. Repeat this procedure for the remote side.

Checking the ODU Configuration

1. Click the Local or Remote **ODU Configuration** icon.

   The Local or Remote ODU Configuration window is displayed.

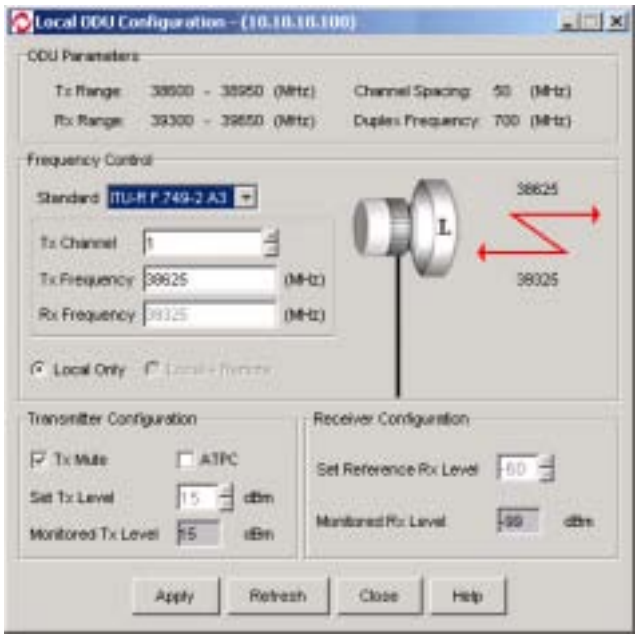


Figure 3-27 ODU Configuration Window

2. Verify that the Monitored Rx Level is at the level previously measured by the DVM (Unfaded RSL).

If any problems were encountered during the verification, refer to *Chapter 6 - Troubleshooting & Diagnostics*.

ODU Installation for a 6/7/8 GHz System

Installation of the ODU for a 6/7/8 GHz FibeAir system is different due to the use of an external *diplexer*. The diplexer includes Tx/Rx filters and a common port which connects to the antenna.

The 6/7/8 GHz ODU consists of an ODU chassis, transceiver, ODC, power supply, IF/RF circuits, and an external diplexer.

Required Components

The following items are required for FibeAir 6/7/8 GHz ODU installation:

- ODU
- ODU Adapter Plate
- Diplexer
- Flexible Waveguide
- Antenna

Note: Before installation, determine whether the Tx frequency at each end is Tx High, or Tx Low.

System Description

The following figure illustrates a typical 6/7/8 GHz ODU installation with a diplexer.

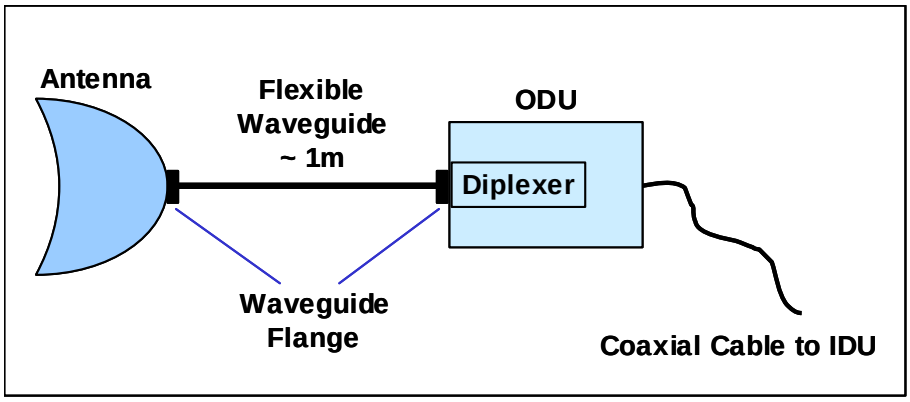


Figure 3-28 Typical 6/7/8 GHz ODU Installation with Diplexer

6/7/8 GHz FibeAir systems use larger antennas than higher frequency systems (up to 15 ft). Signals are routed from the antenna, via a flexible waveguide, to the diplexer installed on the ODU. From the ODU, the signals are routed to the IDU via coaxial cable.

The following figures show the diplexer.

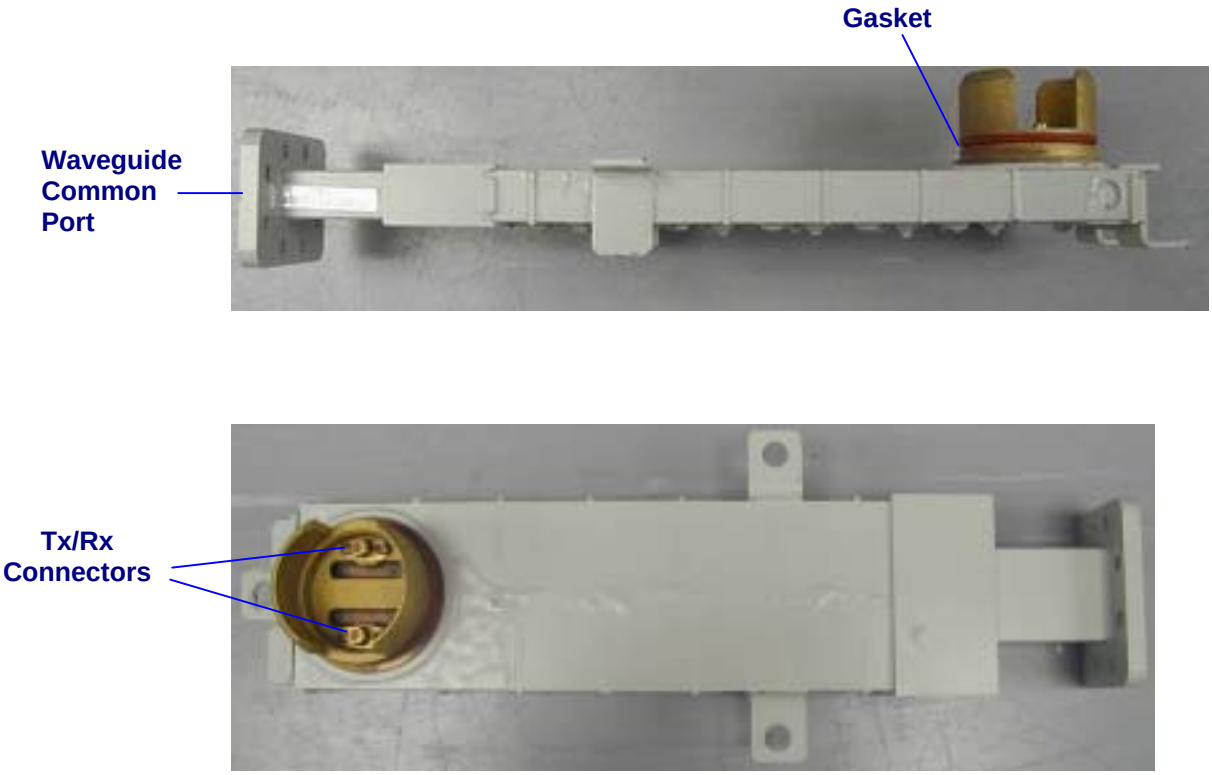


Figure 3-29 Diplexer

Note: The figure above shows the Tx/Rx connector end of the diplexer without a gasket. A **gasket must be installed** around the connector area **with silicon paste** for proper sealing.

Diplexer connection between the common port and the antenna is implemented using a flexible waveguide shown in the figure below.

Figure 3-30 Flexible Waveguide

Note that it's important to know the required waveguide flange type. Ceragon's default flange is CPR112F. However, depending on the client's equipment, the diplexer can be provided with a different flange type.

In addition, see the section *Flange Mating* at the end of this chapter for information about compatible flange types.

The diplexer is connected to the ODU via an adapter plate. The plate is then connected to the pole using a mounting bracket shown in the figure below.

Figure 3-31 Diplexer Adapter Plate

In the figure above, the diplexer adapter plate is connected to the pole using a mounting bracket.

Installation Procedure

To install the 6/7/8 GHz FibeAir ODU with diplexer:

1. Connect the adapter plate to the pole via the mounting bracket, using three nuts and bolts provided with the assembly kit.

Figure 3-32 Mounting Bracket Connected to Pole

Warning: ***Make sure the nuts and bolts are tightened properly, and the washers are in place. A loosely installed ODU may fall and cause damage to humans and/or equipment.***

Note: The adapter plate can be connected to the mounting bracket facing down (for Tx Low) or up (for Tx High). The three nuts and bolts are fastened in three different holes, depending on the direction you choose. (See the *Installation Notes* at the end of the procedure.)

In both cases (Tx Low or High), the ODU N-type connector must be faced down.

2. Connect the gasket end of the flexible waveguide to the diplexer using the 8 screws provided with the kit.

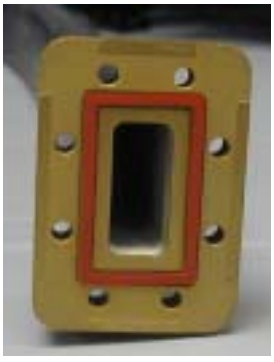


Figure 3-33 Gasket End of Waveguide

Note: The figure above shows the gasket end of the waveguide without the gasket. A **gasket must be inserted in the groove** with silicon paste for proper sealing.

Figure 3-34 Diplexer Connected to Flexible Waveguide

3. Connect the ODU to the adapter plate using 4 latches (no screws), as shown in the following figure.

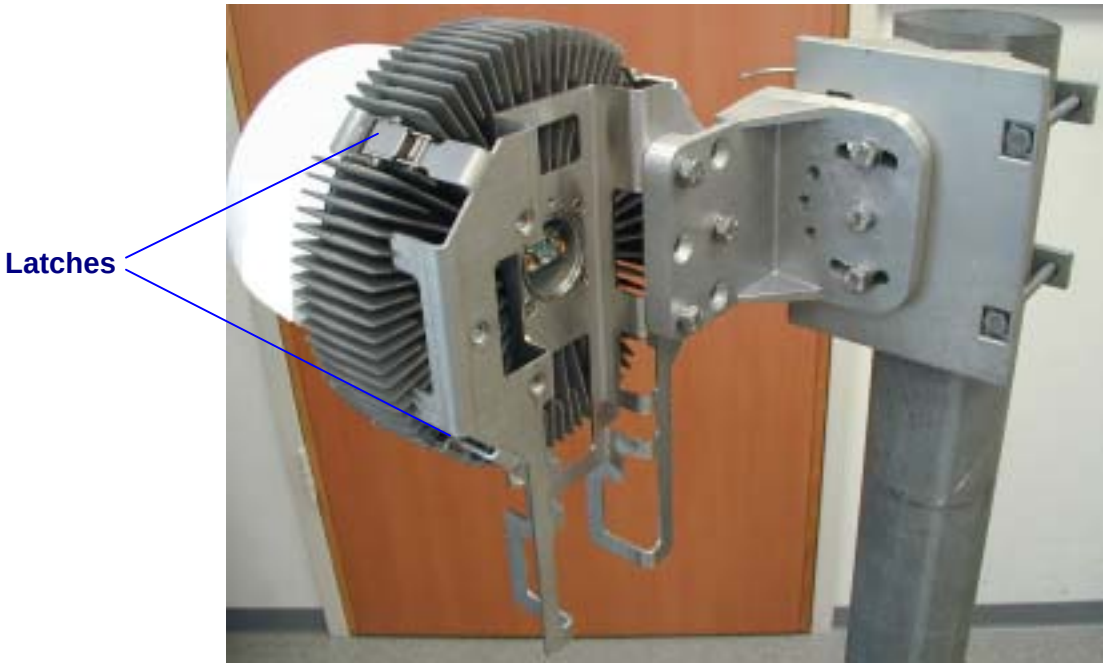


Figure 3-35 ODU Connected to Adapter Plate

4. Before connecting the diplexer to the ODU, apply silicon paste around the diplexer gasket. (Silicon paste is provided with the installation kit.)

5. Insert the diplexer into the adapter plate and ODU carefully, making sure that the gasket has settled well in the ODU cavity.

6. Tighten the diplexer with the waveguide to the adapter plate using 3 screws, as shown in the figure below.

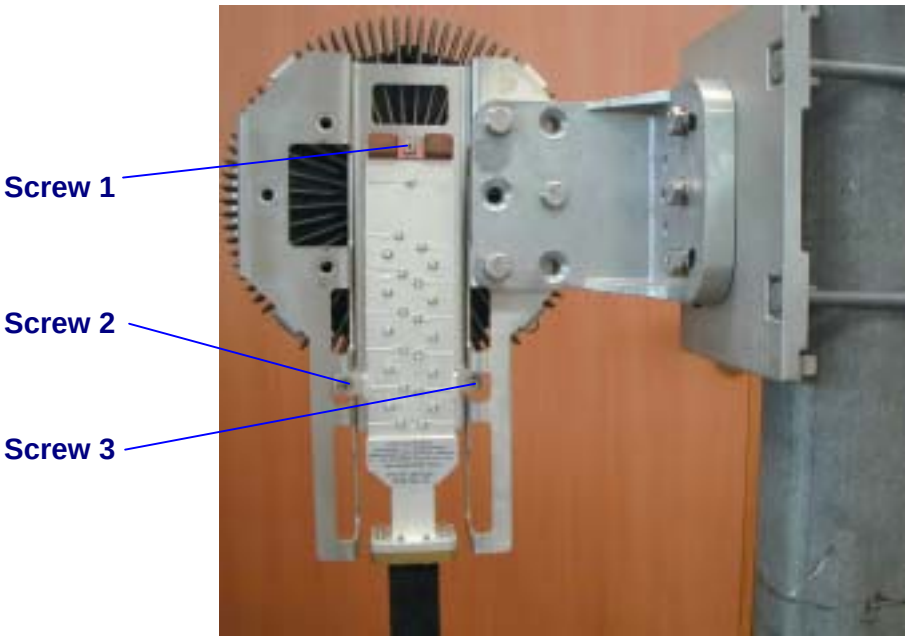


Figure 3-36 Diplexer with Waveguide Connected to Adapter Plate

Screw fastening order:

- Fasten screw 1, without tightening it.
- Fasten screws 2 and 3 without tightening them.
- Tighten screw 1.
- Tighten screws 2 and 3.

Caution: *The Tx/Rx connectors in the diplexer and the ODU are sensitive. Insert the diplexer in the adapter plate carefully.*

Note: The figure above shows the diplexer in the Low position for Tx Low. For Tx High, the diplexer and adapter plate are installed in the opposite direction. (See the *Installation Notes* at the end of the procedure.)

The following figure shows the completed ODU with diplexer assembly.

Figure 3-37 ODU with Diplexer Assembly

Installation Notes:

- Each ODU on either side of the link can be configured for Tx high or Tx low according to the diplexer direction.
- A low diplexer direction means that the Tx frequency channel is lower than the Rx.

  A high diplexer direction means that the Tx frequency channel is higher than the Rx.

  Each link requires one diplexer installed in the low direction and one installed in the high direction, as shown in the following figures.
- Low diplexer direction ODUs must be installed with the handle facing up and the IF connector facing down to avoid water accumulation around it.
- It is recommended to use Coax-Seal tape to tape and seal all connection points of the flexible waveguide and diplexer/antenna.

Figure 3-38 Diplexer Tx Low

Figure 3-39 Diplexer Tx High

- Note that the assembly is not sealed when the diplexer is not connected to the ODU. During installation or disassembly for maintenance purposes, ensure that the ODU and the diplexer are not exposed to dampness or liquid.

Flange Mating

CPR( )G CPR( )F

Half Thick Gasket Full Thick Gasket

<u>CPR( )G with:</u>	CPR( )F:	Use half thick gasket.
	CPR( )G:	Use full thick gasket.
	PDR( ):	Use half thick gasket with PDR( ) gasket.
<u>CPR( )F with:</u>	CPR( ) F:	Mating cannot be pressurized using gaskets. Use a different sealing method.
	PDR( ):	Use PDR( ) gasket.

6-8 GHz Frequency Diversity and 2+0 System Installation

Note: This section refers to 2+0 systems although it is also relevant for N+0 systems.

The Frequency Diversity method uses two FibeAir links, with two active transmitters and receivers on each side of the link connected to one or two antennas. The description in this section relates to an installation with one antenna. The two transmitters on either side of the link operate at different frequencies, and the FibeAir *Hitless Switch* (described below) determines which receiver is receiving the best quality data.

Frequency diversity allows the system to automatically select a frequency for which the channel performance is better than the other frequency.

Frequency diversity systems with a single antenna require a *circulator* to combine the systems. The circulator is a three-port waveguide junction, whereby waves fed into the *n* port are outputed at the corresponding *n*+1 port.

2+0 systems combine two FibeAir links on a single antenna using a circulator, whereby each link operates at a different frequency.

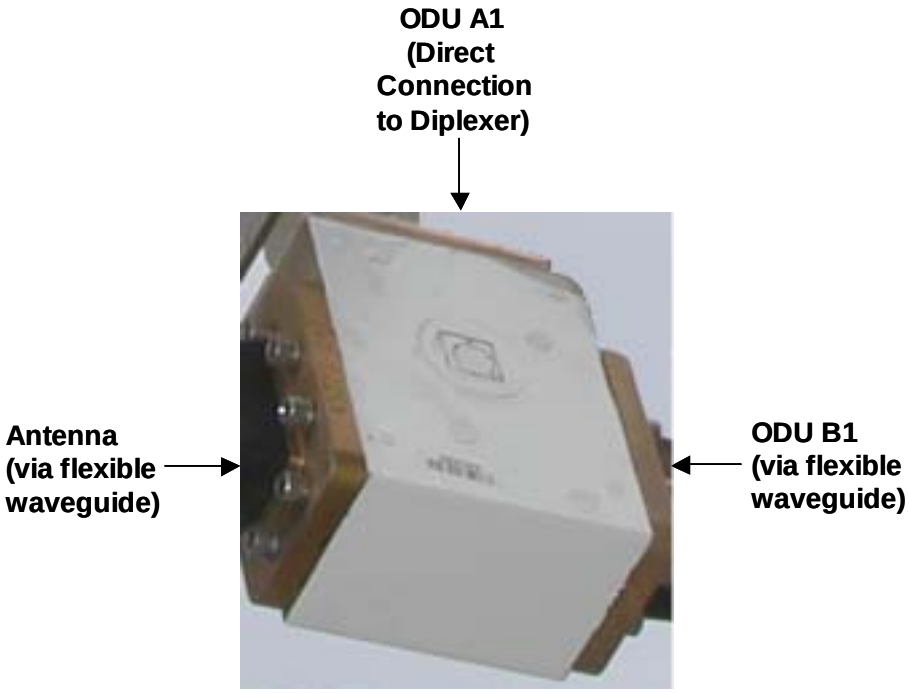
The installation instructions in this section apply for both frequency diversity and 2+0 systems.

The following photo shows a closeup of a circulator installed in a frequency diversity/2+0 system.

Connecting the Circulator

The circulator is connected directly to one ODU diplexer, and to the other ODU via flexible waveguide.

The following figure shows the three circulator ports.



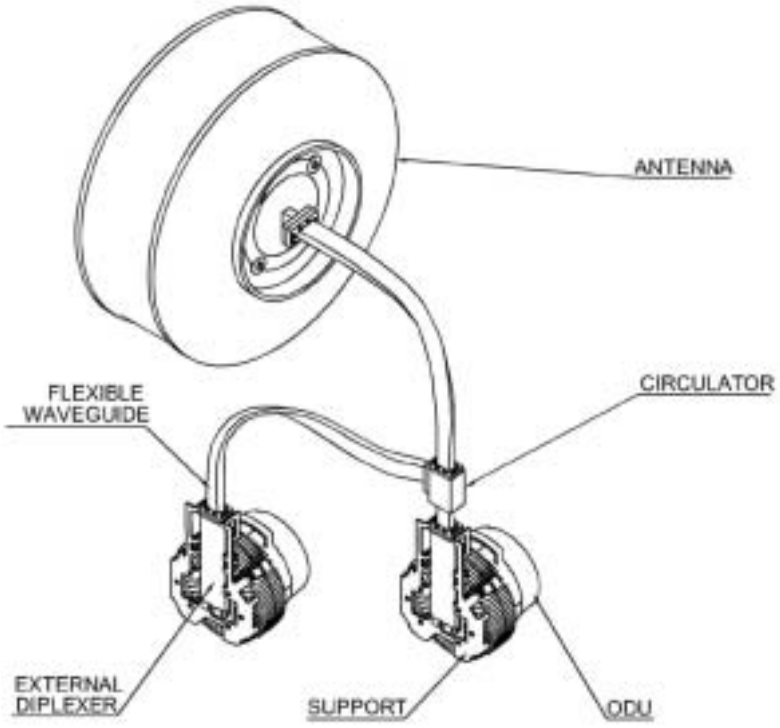
As shown in the figure above, the circulator connections are as follows:

- Direct connection to the ODU A1 diplexer.
- Remote connection (via flexible waveguide) to the ODU B1 diplexer.
- Remote connection (via flexible waveguide) to the antenna.

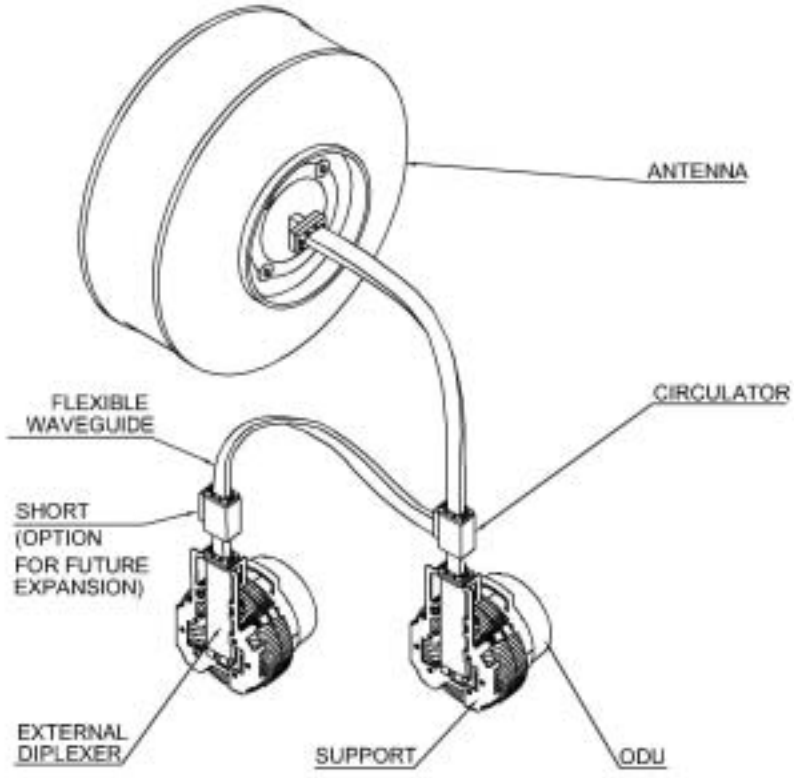
Important:

- **The circulator port connected directly to the ODU diplexer (ODU A1 in the figure above) must also be connected to the corresponding ODU on the remote side (which would be, for our example, A2).**
- **The diplexer connected directly to the circulator must output directly to the antenna (in accordance with the arrow symbols that appear on the circulator).**

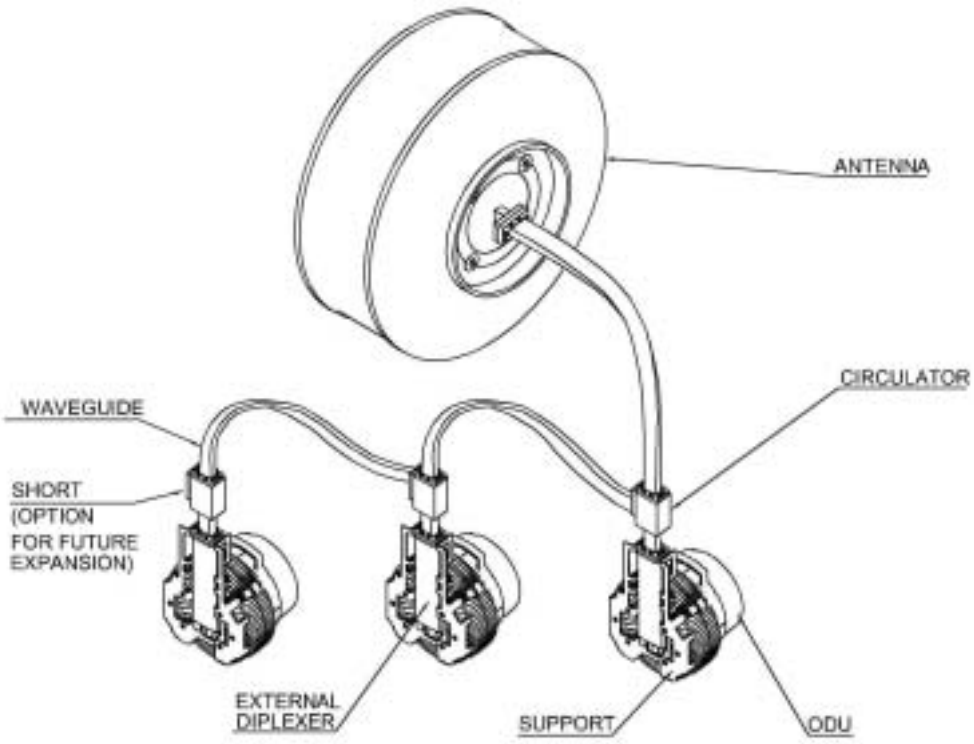
The following diagram shows two ODUs connected to a single antenna via a circulator.



The following diagram shows two ODUs connected to a single antenna via two circulators, whereby one circulator includes a *Short* for future system expansion.



The following diagram shows three ODUs connected to a single antenna via three circulators, whereby one circulator includes a *Short* for future system expansion.



Upgrading a Link to Frequency Diversity / 2+0

The following sections describe frequency diversity/2+0 upgrading with and without a circulator already installed.

Upgrading a System without a Circulator

When a system is changed to a frequency diversity/2+0 system, the link will inevitably fall since a circulator needs to be installed.

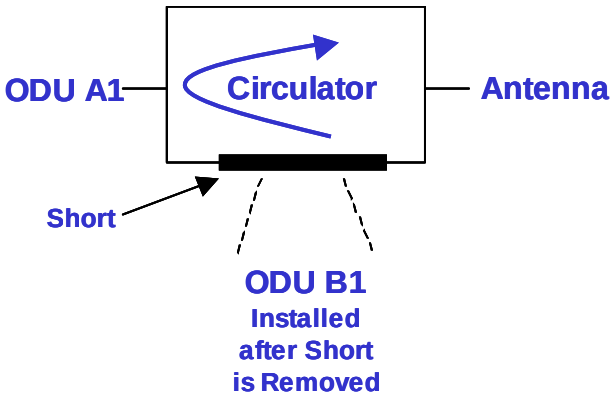
Thus, if the system is initially planned for a future second ODU connection, always install the circulator of the first ODU with a short.

Upgrading a System with a Circulator and Short

Future upgrades to frequency diversity/2+0 systems should be considered when the system is initially planned. The circulator should be installed with future upgrading in mind.

To enable future ODU connection to a frequency diversity/2+0 system that includes only one ODU, a short should be installed on the circulator. The short can be removed when an additional ODU is connected to the circulator.

The following figure shows the circulator with a short.



Important:

A 15 dB degradation of system gain will occur when the short is removed while the system is operating. To minimize the 15 dB degredation time, install an additional ODU connection as follows:

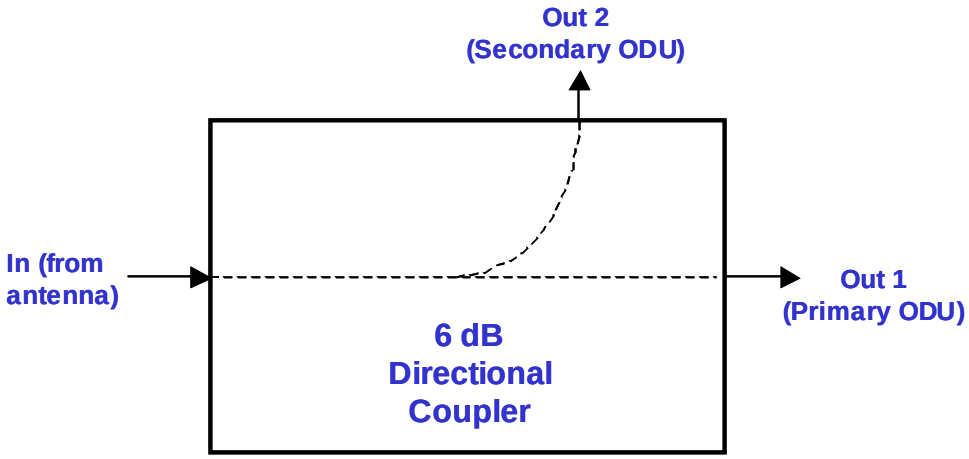
1. Set up the ODU.
2. Connect the diplexer.
3. Connect the flexible waveguide.
4. Remove the short quickly.
5. Connect the waveguide to the circulator.

6-8 GHz 1+1 System Installation

In a 1+1 (Hot Standby) system, two ODUs are connected to a single antenna via a 6 dB directional coupler.

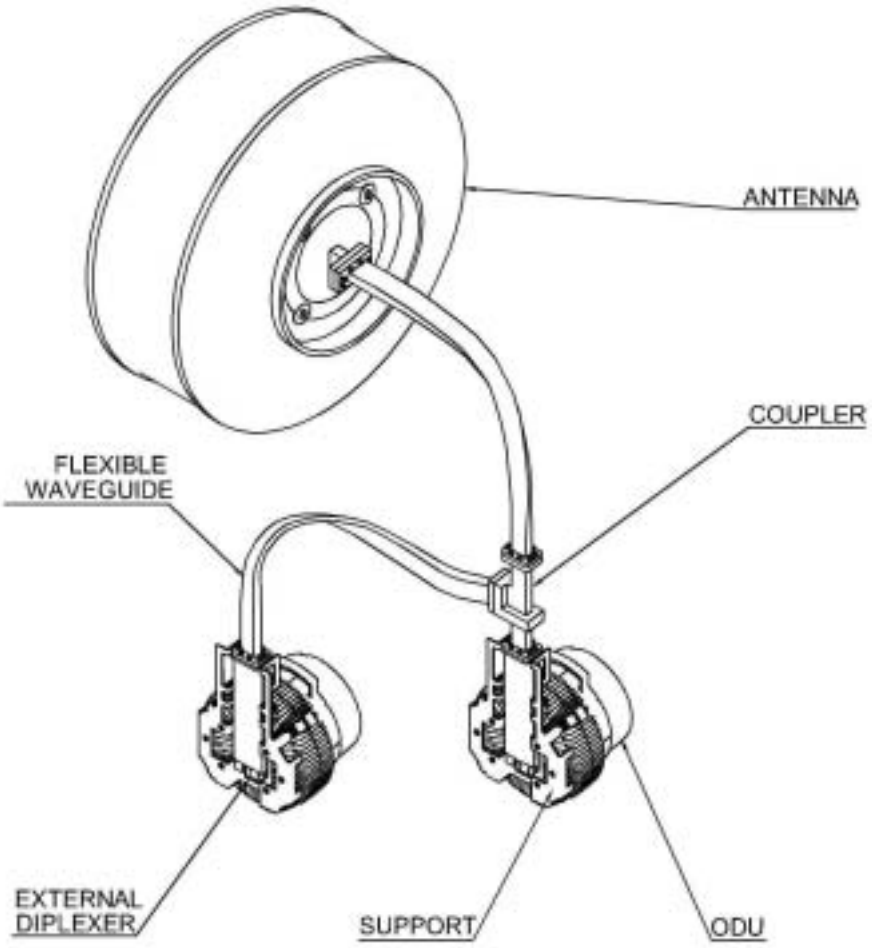
The coupler divides the incoming signal between the two ODUs, whereby one ODU, the primary, actively processes the signal, and the other ODU, the secondary, remains idle, until a protection switch is executed.

The following diagram shows how the coupler operates.



Note that in a 1+1 system, one ODU must be defined as the primary (master) and the other as the secondary (slave).

The following diagram shows two ODUs connected to a single antenna via a coupler.



XPIC Installation and Comissioning

This section describes the installation and commissioning procedure for a FibeAir 1500 system in which the XPIC feature is installed in a Co-Channel Dual Polarization configuration.

Antenna and ODU Installation

1. Install the dual polarization antenna and point it in the direction of the other site.
2. Install the two ODUs on a dual polarization antenna using appropriate mounting kit and mark the ODUs with V and H respectively.

IDU-ODU Cable Installation

3. Install two cables between the ODUs and the drawers. Note that the cable length difference should not exceed 10 meters.
4. Mark the cables with V and H respectively and make sure that V is connected to the right drawer and H is connected to the left drawer. Mark the drawers respectively.

Antenna Alignment

5. Power up drawer V on both ends of the link and configure it to the desired frequency channel and maximum power.
6. Align the antennas, one at a time, until expected RSL is achieved. Make sure achieved RSL is no more than ±4dB from the expected level.

Polarization Alignment

Polarization alignment is required in order to verify that the antenna feeds are adjusted, ensuring that the antenna XPD (Cross Polarization Discrimination) is achieved.

Polarization adjustment should be done on one antenna only.

7. Disconnect the V cable from the V ODU and connect it to the H ODU.
8. Check the RSL achieved in the H ODU and compare it to the RSL achieved by the V ODU.
9. Verify that the XPI (Cross Polarization Interference) is at least 25dB whereby:

$$XPI = RSL_{POL} - RSL_{XPOL}$$

$RSL_{POL} \rightarrow$ Link RSL with the same polarization used at both sites.

$RSL_{XPOL} \rightarrow$ Link RSL with orthogonal polarizations used at both sites.

10. If the XPI is less than 25dB, adjust the feed polarization by opening the polarization screw and gently rotating the feed to minimize the RSL_{XPOL}.

Note that polarization alignment is not always possible since the RSL_{XPOL} might fall below the sensitivity threshold of the ODU.

Individual Link Verification

Before operating in XPIC configuration, each one of the links (V and H) should be commissioned individually in order to verify their proper operation.

11. Power up the V drawers on both ends and verify the frequency channel and Tx power configuration.
12. Verify that the RSL is no more than ±4dB from the expected level.
13. Run a BER stability test on the link for at least 15 minutes to ensure error-free operation of the link.
14. Power up the H drawers on both ends and verify the frequency channel and Tx power configuration.
15. Verify that the RSL is no more than ±4dB from expected level.
16. Run a BER stability test on the link for at least 15 minutes to ensure error-free operation of the link.

XPIC Configuration

17. Using the XPIC cable, connect the two ODUs at each end to the TNC connectors. Make sure that the cable is no longer than 3 meters.
18. Configure the drawers to work in XPIC mode.
19. Verify that the RSL at all four ODUs is no more than ±4dB from the expected level.
20. Verify that no alarms were raised (if an STM-1 line is connected).

XPIC Recovery Test

In order to verify the XPIC operation, simulate the faults described below.

21. Disconnect the IDU-ODU cable for each one of the drawers, one at a time, and verify that the other link is operating.
22. Disconnect the XPIC cable and check that the relevant alarms were raised.
23. Power down each one of the drawers and verify that the other link is operating.
24. Swap the V and H cables and check that the relevant alarm was raised.

25. Mute and then un-mute one ODU at a time and verify that the other link is operating.

XPIC Link Verification

26. Verify that the link is working in XPIC mode (same channel).

27. On one IDU, connect an SDH analyzer to each of the STM-1 ports with a physical loop on the remote IDU, and then run a BER stability test for at least two hours.

Chapter 4
System Setup

Prerequisites

The system setup and configuration follows the system installation, initial testing, and antenna alignment as described in Chapter 3.

The Setup Procedure

The FibeAir setup procedure consists of the following operations :

1. Defining general settings
   - Setting local device communication parameters
   - Setting SNMP parameters
2. Defining system configuration parameters
   - Setting transmit frequency
   - Setting output power levels
3. Defining system information
   - Date
   - Time
   - Name
   - Contacts
   - Location
4. Defining SONET/SDH configuration parameters
5. Defining management setup parameters
   - Defining manager list
   - Defining alarm groups
   - Setting external alarm inputs
   - Setting alarm outputs

Getting Started

To start the FibeAir radio link configuration you first need to set up the Ethernet and PPP/SLIP IP addresses. Once you have defined these addresses, you will be able to configure the system.

To set the addresses, perform the following operations:

1. Connect the RS-232 port of your computer to the RS-232 (9-PIN) port on the indoor unit front panel. This port is labeled “Terminal” and is located near the front panel LEDs.

2. Connect to the standard Windows HyperTerminal at 19,200 bits per second (see the following section: *Connecting to the HyperTerminal*).

3. After you connect to the terminal, press **Enter**.

   The login menu appears.

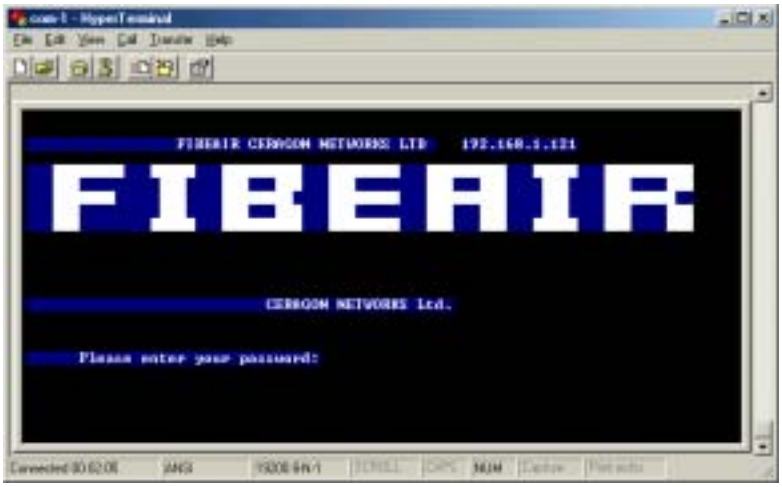


Figure 4-1 FibeAir Terminal Login Screen

4. Type **ceragon** as the password.

   The main menu appears.

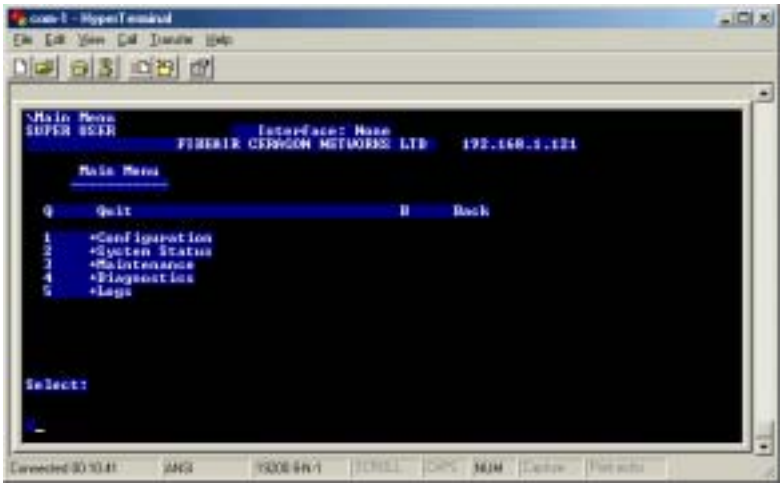


Figure 4-2 FibeAir Terminal Main Menu

Connecting to the HyperTerminal

Setting Up the HyperTerminal Connection

To set up the HyperTerminal connection, perform the following operations:

1. Connect the RS232 port of your computer to the Terminal port of the IDU.
2. Select **Start ➢ Programs ➢ Accessories ➢ Communication ➢ HyperTerminal**.
3. Double-click the **HyperTerminal** application icon.
4. In the Connection Description box, enter the name **Terminal** and click **OK**.
5. In the **Connect Using** field (in the Phone Number box) select **Direct to Com 1** and click **OK**.
6. In the **Port Settings** tab (Com 1 Properties box) configure the following settings:

   Bits per second - 19,200

   Data bits - 8

   Parity - None

   Stop bits - 1

   Flow control - Hardware
7. Click **OK**.
8. End the HyperTerminal connection.

Connecting to the Terminal

To connect to the terminal, perform the following operations:

1. Connect the RS232 port of your computer to the Terminal port of the IDU.
2. Select **Start ➢ Programs ➢ Accessories ➢ HyperTerminal**.
3. Double-click the **Terminal** connection icon. The HyperTerminal screen opens.
4. Enter the password **Ceragon** and press **Enter**. The Main Configuration Menu appears.

Note*: The Terminal screens are depicted here as black text on a white background for ease of reading. The original screens are white text on black background.*

Setup for FibeAir 1500/1528/1500A/1528A

The Configuration menu allows you to fully configure the FibeAir system without the CeraView application.

Figure 4-3 Configuration Menu

Selecting the relevant options from the Configuration menu will guide you to the desired menu. The relevant operations are listed in each menu.

Setting the Frequency Channel

To set the frequency channel, perform the following operations:

1. Connect to the Terminal.
2. From the Configuration menu, select **Full Configuration**.
3. From the Full Configuration menu, select **(5) Frequency Plan**. The Frequency Plan menu appears.

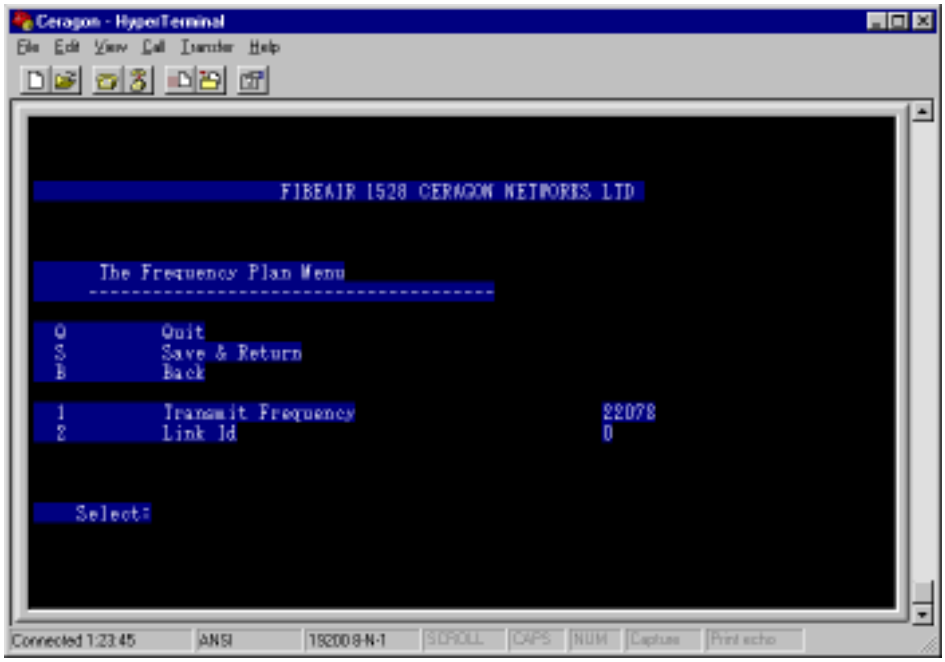


Figure 4-4 Frequency Plan Menu

4. From the Frequency Plan menu, select **(1) Transmit Frequency**.
5. Enter the desired channel frequency.

   For frequencies of 8 GHz or lower, the Rx frequency should be manually entered as well.
6. Select **(S) Save & Return** to save the settings and return to the Full Configuration menu.

Setting the Transmit Power Level

To set the transmitter power, perform the following operations:

1. Connect to the Terminal.
2. From the Main Configuration menu, select **Full Configuration**.
3. From the Full Configuration menu, select **(6) ODU Configuration**.

   The ODU Configuration menu appears.

Figure 4-5 ODU Configuration Menu

4. Select **(1) Transmit level**.

5. Enter the desired transmit level. The acceptable values are between -10 dBm and +15 dBm. Take into account the received level you expect (the default received level is +15 dBm).

6. Select **(S) Save & Return** to save the settings and return to the Full Configuration menu.

For frequencies other than 38 GHz, the transmit level can be higher than 15 dBm. Refer to Appendix E for more details.

Setting the IP Addresses

To set the IP Addresses, perform the following operations:

1. Connect to the Terminal.

2. From the Main Configuration menu, select **Full Configuration**.

3. From the Full Configuration menu, select **(1) IP Configuration**. The IP Configuration menu appears.

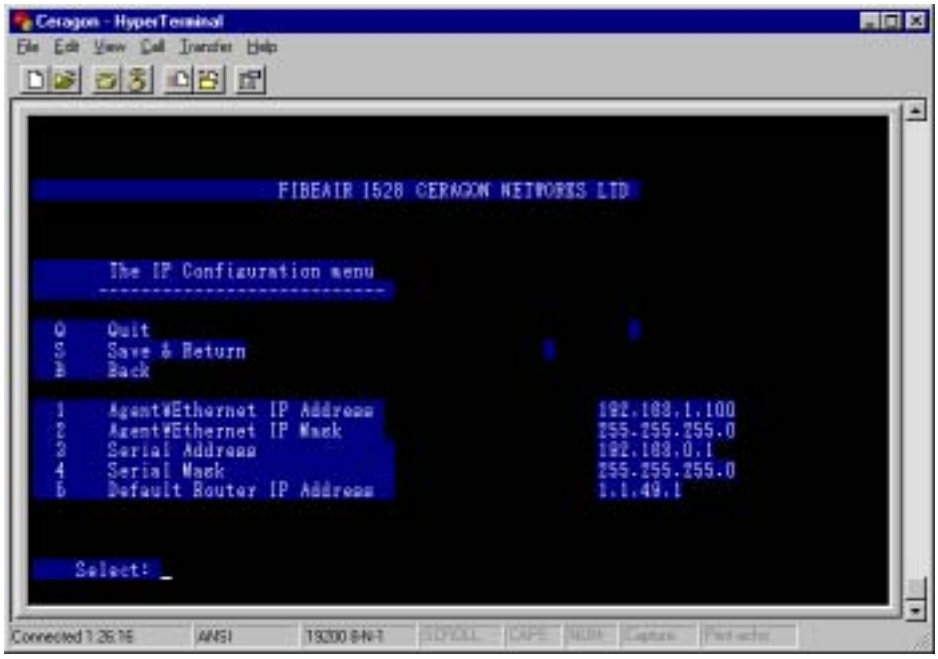


Figure 4-6 IP Configuration Menu

For Ethernet Configuration:

6. Select **(1) Agent\Ethernet IP Address**, and enter the IP address.
7. Select **(2) Agent\Ethernet IP Mask**, and enter the IP mask.

For Serial Communication (Slip, PPP, or Dial-up Modem):

8. Select **(3) Serial Address**, and enter the serial address.
9. Select **(4) Serial Mask**, and enter the serial mask.
10. Select **(5) Default Gateway Router**, and enter the router's address.
11. Select **(S) Save & Return** to save the settings and return to the Full Configuration menu.
12. Restart the IDU.

Configuring Serial Communication Settings (direct or dial-up)

This configuration is required when a dial up modem or a computer is connected to the IDU's serial port. To configure the serial communication setings, perform the following operations:

1. Connect to the Terminal.
2. From the Main Configuration menu, select **Full Configuration**.
3. From the Full Configuration menu, select **(3) Serial Configuration**.
4. From the Serial Configuration menu, select **(1) Interface Communication**. The Interface Configuration menu appears.

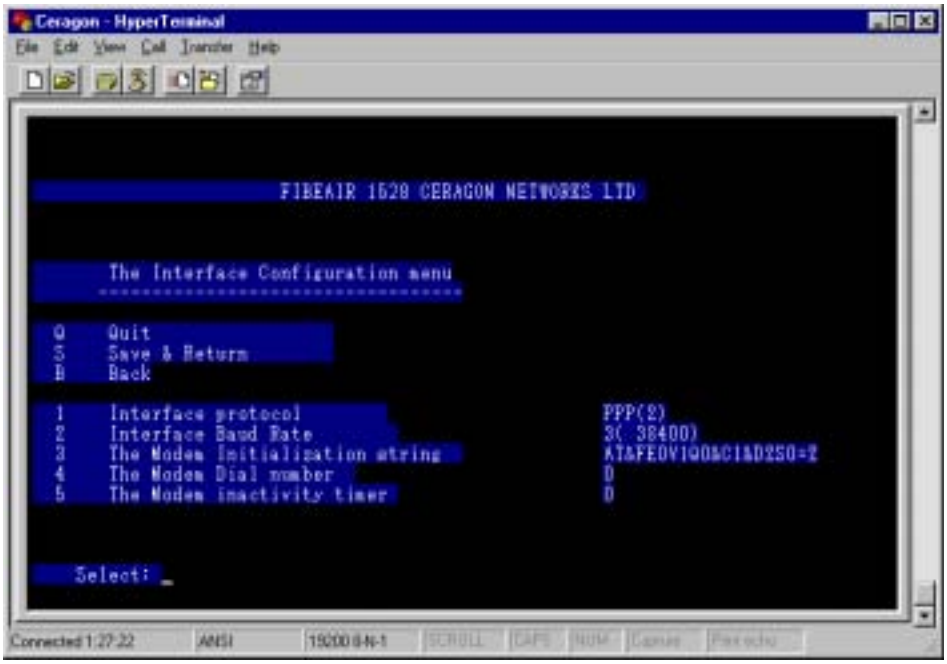

Ceragon - HyperTerminal
File Edit View Call Transfer Help
FIBEAIR 1528 CERAGON NETWORKS LTD
The Interface Configuration menu
Q Quit
S Save & Return
B Back
1 Interface protocol PPP(2)
2 Interface Baud Rate 3(38400)
3 The Modem Initialization string AT&FE0V1Q0&C1&D2S0=2
4 The Modem Dial number D
5 The Modem inactivity timer 0
Select:
Connected 1:27:22 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-7 Interface Configuration Menu

5. Select **(1) Interface Protocol**, and then select (2) PPP or (3) SLIP.

6. Select **(2) Interface Baud rate**, and then select the desired baud rate.

***Note**: For a modem connection, choose no more than 19,200. For a direct connection to a nearby computer, choose 38,400. Make sure that the same rate is defined in your network manager's dial up connection.*

7. In **(3) The Modem Initialization String**, leave the default string.

***Note:** Normally, the default should be used, unless the modem is connected through a PABX or in any other special case. In these cases, consult Ceragon Technical Service department.*

8. Select **(4) The Modem Dial Number** and enter a number if necessary.

***Note:** This is the telephone number to which the network manager's modem is connected.*

9. Select **(5) The Modem Inactivity Timer** and enter the value "0".

***Note:** This parameter states how long should the phone call will remain active when no data is transferred on the line. A value of 0 (zero), disables this inactivity timer.*

10. Select **(S) Save & Return** to save the settings and return to the Full Configuration menu.

Configuring PPP Security Settings

The PPP protocol adds security to the communication, and therefore, additional parameters need to be configured in the system. This screen is not relevant for a SLIP connection.

To configure the PPP Security settings, perform the following operations:

1. Connect to the Terminal.
2. From the Main Configuration menu, select **Full Configuration**.
3. From the Full Configuration menu, select **(3) Serial Configuration**.
4. From the Serial Configuration menu, select **(2) PPP Security**. The PPP Security menu appears.

Figure 4-8 PPP Security Menu

5. Select **(1) PPP Authentication Protocol**. Define the protocol:

   0 = None

   1 = PAP (without encryption)

   2 = CHAP (with encryption)

6. Select **(2) PPP Authentication Mode**.

   2 = GUEST: The IDU gives the “user name” and the “password” to the network manager.

   3 = HOST: The IDU receives the “use name” and the “password” from the network manager and validates them.

   4 = DYNAMIC: When the IDU receives a phone call, then it acts as HOST. If it initiates a call to the network manager (SNMP trap), it will act like a GUEST. In case of a direct connection (without a dialup modem), it acts as HOST.

7. Select **(3) Access Device Security Identity.** Enter user name (password). This will be sent by the IDU when configured for authentication and acts like a GUEST.

8. Select **(4) External Device Security Identity.** Enter user name (password). This will be received and validated by the IDU when configured for authentication and acts like a HOST.

9. Select **(S) Save & Return** to save the settings and return to the Full Configuration menu.

SNMP Configuration

To connect to the IDU with SNMP-based management, you need to define the SNMP communities. These are passwords that define access rights of different users. If these are not identical to the definitions in the network management software (CeraView or any other SNMP based software), the authentication process will fail and access to the radio link is denied.

To configure the SNMP communities, perform the following operations:

1. Connect to the Terminal.

2. From the Main Configuration menu, select **Full Configuration**.

3. From the Full Configuration menu, select **(2) SNMP Configuration**. The SNMP Configuration menu appears.

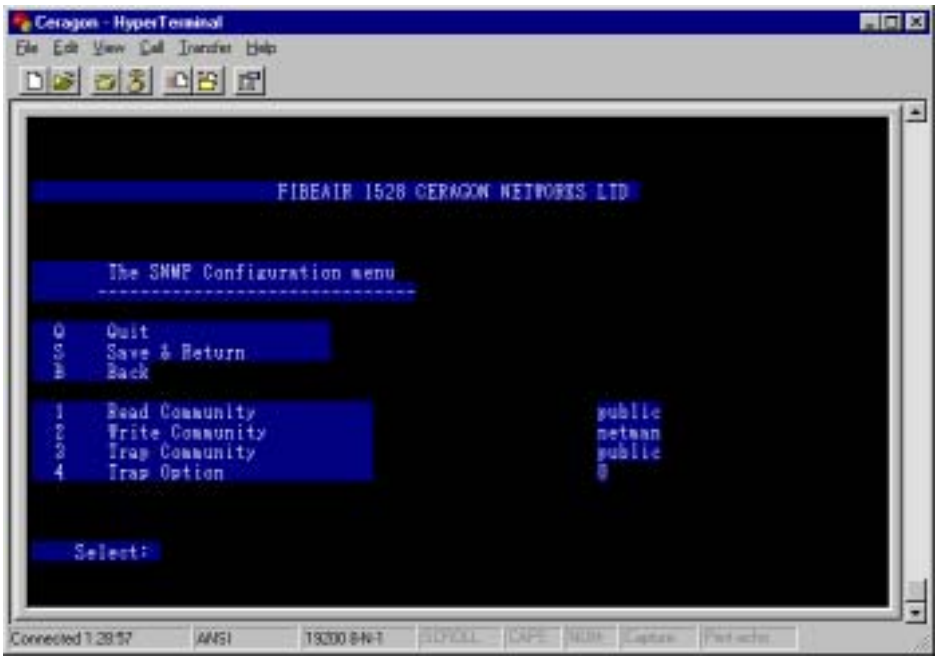


Figure 4-9 SNMP Configuration Menu

4. Select **(1) Read Community** and set it to **public**. Users with this community will be allowed to read the link information, but will not be allowed to change anything.

5. Select **(2) Write Community** and set it to **netman**. Users with this community will be allowed to read and modify link information**.**

6. Select **(3) Trap Community** and set it to **public**. This password will be used by the IDU when it reports to a SNMP based manager. The same password needs to be included in the manager itself.

7. Select **(4) Trap Option** and set it to **Standard Trap (0)**. In the "Standard Trap" option, serial numbers will be added only to the private MIB traps. Otherwise, serial numbers will be added to all SNMP traps.

8. Select **(S) Save & Return** to save the settings and return to the Full Configuration menu.

9. Restart the IDU.

Connecting to the IDU

You can perform the physical connection to the IDU using one of the following methods:

- Connecting via the Ethernet port
- Connecting via the serial port using PPP/SLIP
- Connecting via the serial port using a dial-up modem

Connecting Via the Ethernet Port

1. Connect an Ethernet cable to the Ethernet port of the IDU. If the IDU is connected directly to the computer, use a cross cable. If the IDU is connected to a LAN (wall socket), use a standard straight cable.

2. Set the Ethernet IP address and mask to the IDU using the HyperTerminal. The default Agent/Ethernet IP address is 192.168.1.1 and the Agent/Ethernet IP mask is 255.255.255.0

3. Make Sure the Ethernet IP address of your PC is on the same sub-net as the IDU's Ethernet IP address, and that the masks are identical.

4. Check and change the Ethernet address of the PC as follows:

   Windows 98/2000:

   - Select Start ➢ Settings ➢ Control Panel ➢ Network.
   - Select the TCP/IP Ethernet component that was installed on the PC and click Properties.
   - On the IP Address tab select Specify an IP Address and enter the appropriate IP address and mask.

Windows NT:

- Select Start ➢Settings ➢ Control Panel ➢ Network.
- Select **Protocols**, then select **TCP/IP** protocol and then click **Properties**.
- On the IP Address tab select **Specify an IP Address** and enter the appropriate IP address and mask.

5. To verify connectivity, ping the IDU's Ethernet IP address and make sure you have a reply as follows:
   - Select **Start ➢Run**.
   - Type **ping** followed by the IP address, and click **OK**.
6. Run the CeraView management application.

Connecting Via the Serial Port Using PPP/SLIP

1. Connect an RS-232 9-pin cable to the serial port of the IDU.
2. Install a PPP or SLIP driver. Refer to Appendix A for details.

   Set the serial IP address and mask of the IDU using the Hyper-Terminal. The default serial IP address is 192.168.10.1 and the serial IP mask is 255.255.255.0.

   Make sure that the serial IP address of your PC is on the same sub-net as the IDU's serial IP address, and that the masks are identical.

Windows 98/2000:

3. Check and change the serial address of the PC as follows:
   - Select Start ➢Settings ➢Control Panel ➢Network.
   - Select the TCP/IP Dial-up Adapter component that was installed on the PC and click **Properties**.
   - On the IP Address tab select **Specify an IP Address** and enter the IP address and mask that are on the same sub-net as the IDU you want to connect to.

   Make sure that the serial IP address of the PPP/SLIP driver you have installed is on the same sub-net as the IDU's serial IP address, and the masks are identical.
4. To check and change the serial address of the PPP/SLIP driver double-click **My Computer**.
5. Double-click **Dial-up Networking**.
6. Click the icon that was added after the installation of the PPP/SLIP driver, and select **Properties**.
7. Verify that the protocol (PPP or SLIP) and the baud rate match the serial configuration that was set on the HyperTerminal.
8. Select **Server Type** and click **TCP/IP Setting**.

9. Select **Specify IP Address** and enter address on the same sub-net as the serial address of the IDU.

10. Double-click this icon whenever you would like to establish communication with the IDU.

Windows NT:

3. To check and change the serial address of the PPP/SLIP driver double-click **My Computer**. Double-click **Dial-Up Networking**.

4. Click **More,** select **Edit entry** and **modem properties**.

5. On the Basic tab verify that you are dialing using **NT Direct Connection**.

6. Click **Configure** and verify that the Initial speed (bps) is as configured on the HyperTerminal.

7. Select **Server** tab and chose **PPP** or **SLIP** as your **Dial-up server type.** Verify that the protocol (PPP or SLIP) and is in accordance to the serial configuration that was set on the Hyper Terminal.

8. Check only **TCP/IP** then Click **TCP/IP Settings.**

9. Select **Specify IP Address** and enter address on the same sub-net as the serial address of the IDU.

10. Make sure that **Server assigned name server addresses** is selected and **Use IP header compression** and **Use default gateway on remote network** are unchecked.

11. Whenever you wish to connect to the IDU, double-click **Dial-Up Networking** and select the number you wish to dial at the **Phonebook Entry**.

12. To verify connectivity, ping the IDU's Ethernet IP address and make sure you have a reply: Select **Start ➔ Run** and open **ping** *IP address*.

Once communication is established, run the CeraView management application.

Connecting Via a Serial Port Using a Dial-Up Modem

1. Double-click **My Computer** and then double-click **Dial-up Networking**.

2. Double-click **Make New Connection**. Type a name for the new connection (Ceragon, for example), and select the modem you are using to dial.

3. Click **Configure**. On the **General** tab, set the maximum speed available and uncheck the **Only connect at this speed** box.

4. On the **Connection** tab set Data bits = 8, Parity = none, and Stop bits = 1.

5. Check the **Wait for dial tone** box and uncheck **the Call if not connected in 90 seconds** box.

6. Uncheck **Disconnect a call if idle for more than … seconds**.

7. Click **Port Settings** and check **Use FIFO Buffers** and then click **OK**.

8. Click **Advanced** and uncheck the **Use error control** and **Use flow control** boxes.

9. Make sure that **Modulation type** is set to **Standard**.

10. Click **Server Type** and select **PPP** or **SLIP** as Dial-up Server. Check only **TCP/IP**.

11. Make sure that you select the serial interface that was configured in the Hyper Terminal.

12. Click **TCP/IP Settings** and specify an IP address. The IP address should be on the same sub-net as the serial address of the IDU.

13. Select **Server assigned name server addresses** and uncheck the **Use IP header compression** and **Use default gateway on remote network** boxes.

Modem

1. Connect the modem to the serial port of the IDU and to an analog telephone line.

2. Make sure that the cable for the modem has the following pin-out:

DB9	DB25
1	20
2	2
3	3
4	8
5	7
7	5
8	4
Isolated shields	

3. When using a standard modem, the dip-switch configuration should be set as follows: Switches 3 & 8-down (Display results codes & Smart mode).

Setup for FibeAir 1500P

The Configuration menu allows you to configure FibeAir 1500P without using the CeraView application.

To start CeraView, see the section *Getting Started* at the beginning of this chapter.

The main menu includes the following sections:

Configuration (1) - the main setup section in which you can configure the IDC, the right and left drawers, protection, SNMP management, in-band routing, and other such parameters.

System Status (2) - used to obtain information about the different software versions currently used in the system.

Maintenance (3) - used to perform software upload, download, and reset.

Diagnostics (4) - used to perform loopbacks and obtain system information.

Logs (5) - used to view alarm and configuration logs.

Configuration

To configure FibeAir 1500P:

1. In the main menu (shown in the section *Getting Started* at the beginning of this chapter), select **1 - Configuration**.

   The Configuration menu appears.

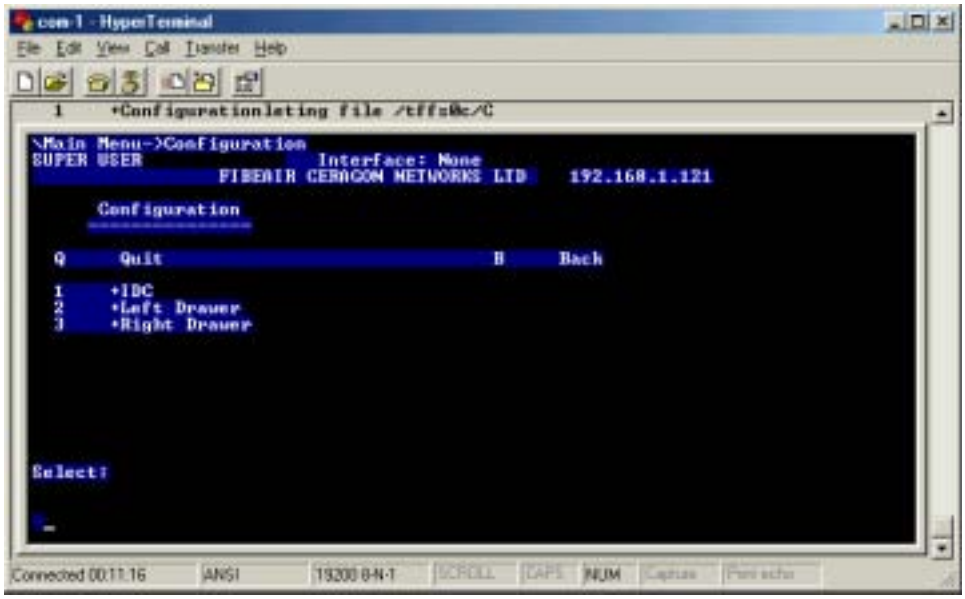


Figure 4-10 Configuration Menu

2. Select the module you want to configure by typing the number beside it.

3. In the screen that appears, select either Basic or Advanced parameters.

The following screen appears for IDC Basic:

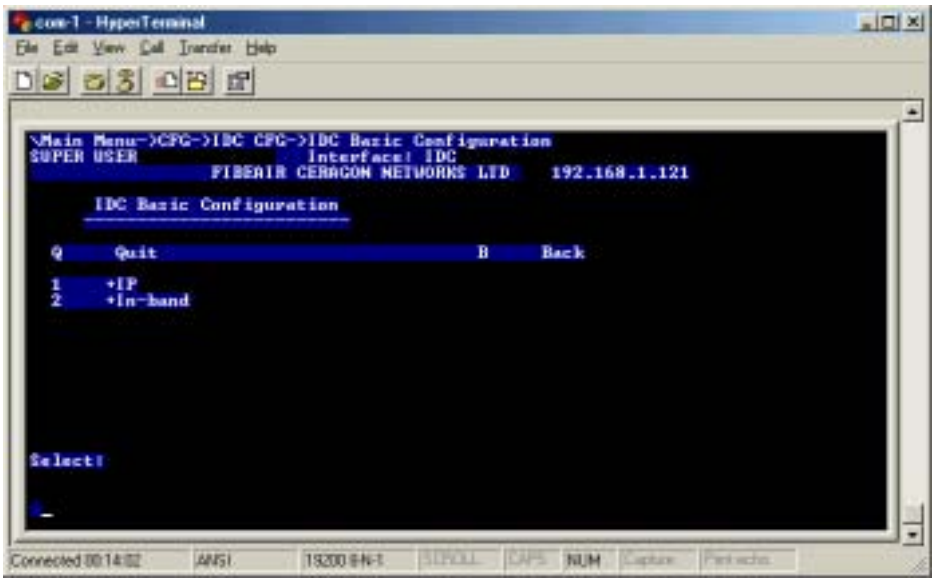

com-1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->CFG->IDC CFG->IDC Basic Configuration
SUPER USER Interface: IDC
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
IDC Basic Configuration
Q Quit B Back
1 +IP
2 +In-band
Select:
Connected 00:14:02 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-11 IDC Basic Configuration

The following screen appears for IDC Advanced:

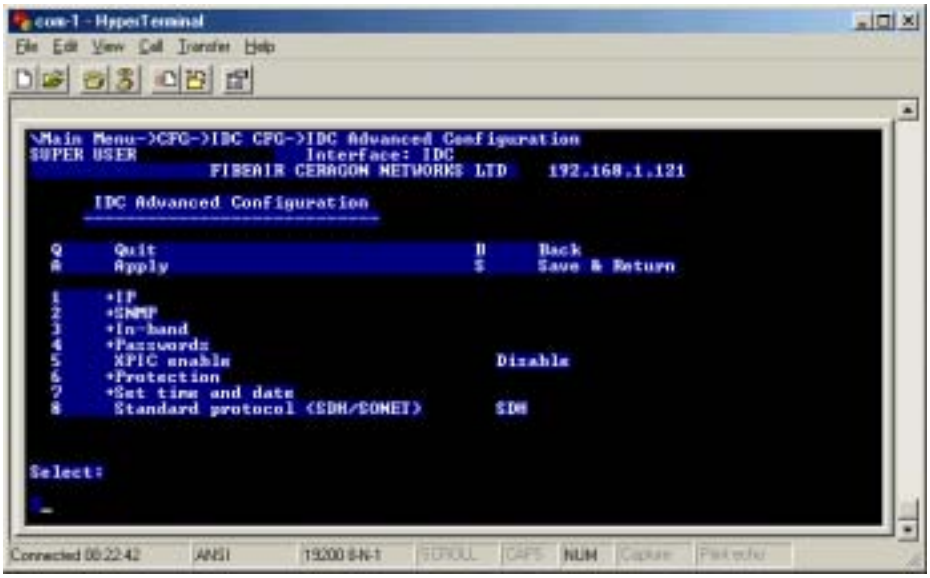

com-1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->CFG->IDC CFG->IDC Advanced Configuration
SUPER USER Interface: IDC
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
IDC Advanced Configuration
Q Quit B Back
A Apply S Save & Return
1 +IP
2 +SNMP
3 +In-band
4 +Passwords
5 XPIC enable Disable
6 +Protection
7 +Set time and date
8 Standard protocol (SDH/SONET) SDH
Select:
Connected 00:22:42 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-12 IDC Advanced Configuration

The following screen appears for Drawer Basic:

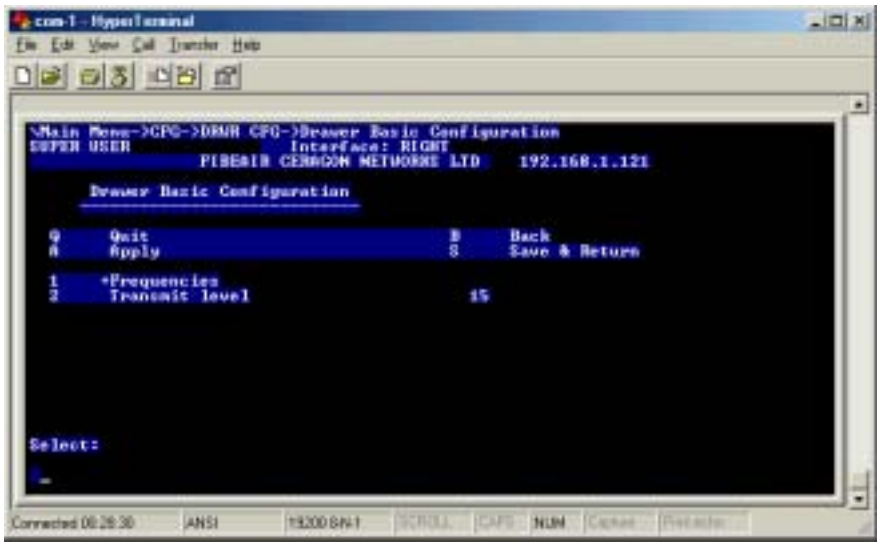

com-1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->CFG->DRWR CFG->Drawer Basic Configuration
SUPER USER Interface: RIGHT
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
Drawer Basic Configuration
Q Quit B Back
A Apply S Save & Return
1 *Frequencies
2 Transmit level 15
Select:
Connected 00:26:30 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-13 Drawer Basic Configuration

The following screen appears for Drawer Advanced:

com-1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->CFG->DRWR CFG->Drawer Advanced Configuration
SUPER USER Interface: RIGHT
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
Drawer Advanced Configuration
Q Quit B Back
A Apply S Save & Return
1 *General
2 *ODU
3 *Transport
4 Force Remote Mute Tx OFF
5 Force Remote Max Tx 15
6 *Wayside channel
Select:
Connected 00:30:01 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-14 Drawer Advanced Configuration

4. To configure a parameter, type the number beside the parameter, and then type the number of the desired value, or enter the value manually in the entry box that appears.

System Status

To view system status information:

1. In the main menu (shown in the section *Getting Started* at the beginning of this chapter), select **2 - System Status**.

   The Status menu appears.

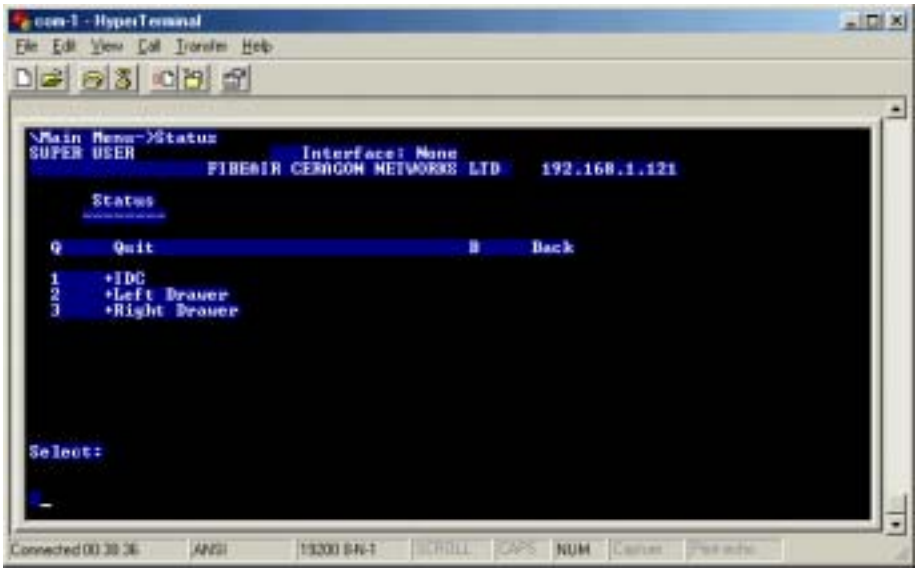


Figure 4-15 Status Menu

2. Select the module for which you want view status information by typing the number beside it.

   The following screen appears for IDC Status:

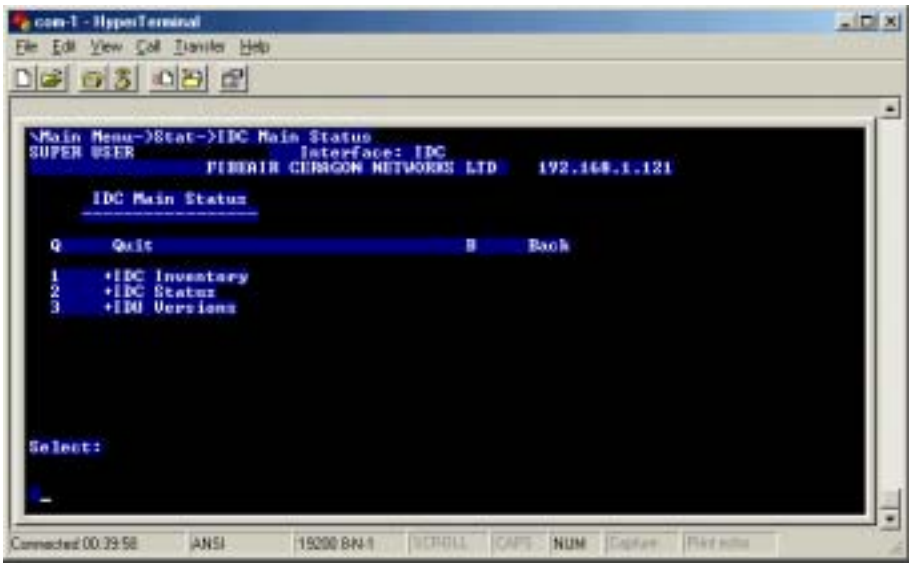

com-1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->Stat->IDC Main Status
SUPER USER Interface: IDC
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
IDC Main Status
Q Quit B Back
1 +IDC Inventory
2 +IDC Status
3 +IDU Versions
Select:
Connected 00:39:58 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-16 IDC Status

The following screen appears for Drawer Status:

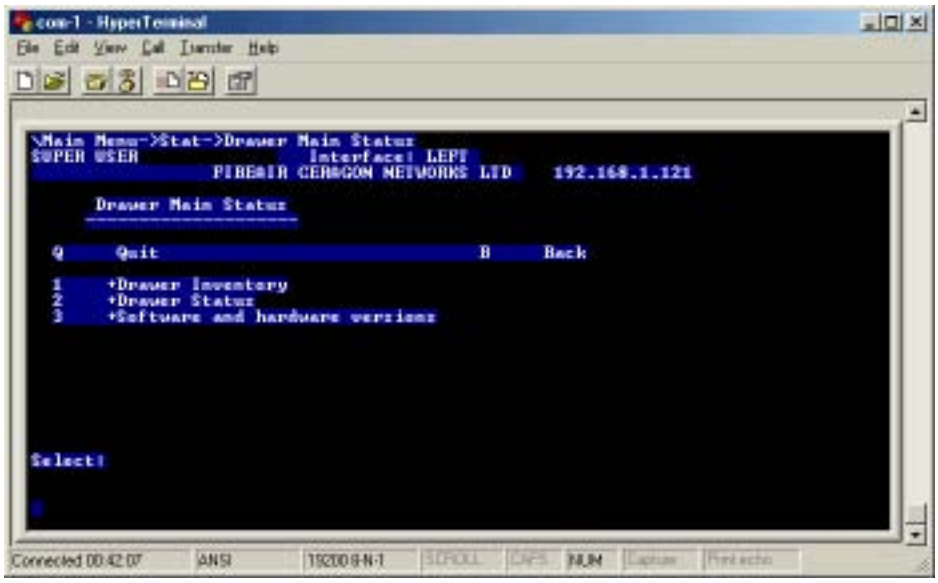

com-1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->Stat->Drawer Main Status
SUPER USER Interface: LEPI
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
Drawer Main Status
Q Quit B Back
1 +Drawer Inventory
2 +Drawer Status
3 +Software and hardware versions
Select:
Connected 00:42:07 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-17 Drawer Status

3. Select the number beside the information you want to view.

   The following screen is an example of an IDC Inventory status report.

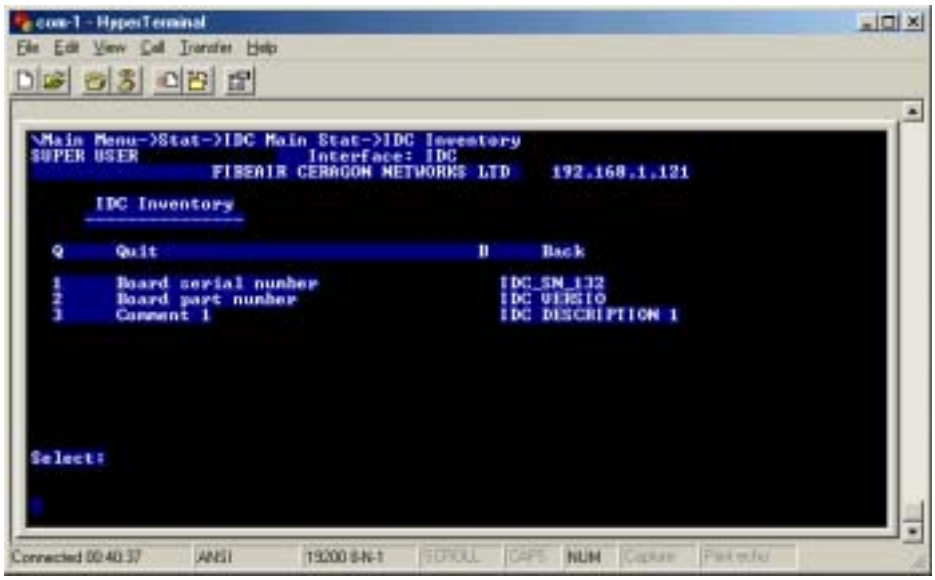

com-1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->Stat->IDC Main Stat->IDC Inventory
SUPER USER Interface: IDC
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
IDC Inventory
Q Quit B Back
1 Board serial number IDC_SN_132
2 Board part number IDC VERSIO
3 Comment 1 IDC DESCRIPTION 1
Select:
Connected 00:40:37 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-18 IDC Inventory Status Example

Maintenance

To perform maintenance operations:

1. In the main menu (shown in the section *Getting Started* at the beginning of this chapter), select **3 - Maintenance**.

   The Maintenance menu appears.

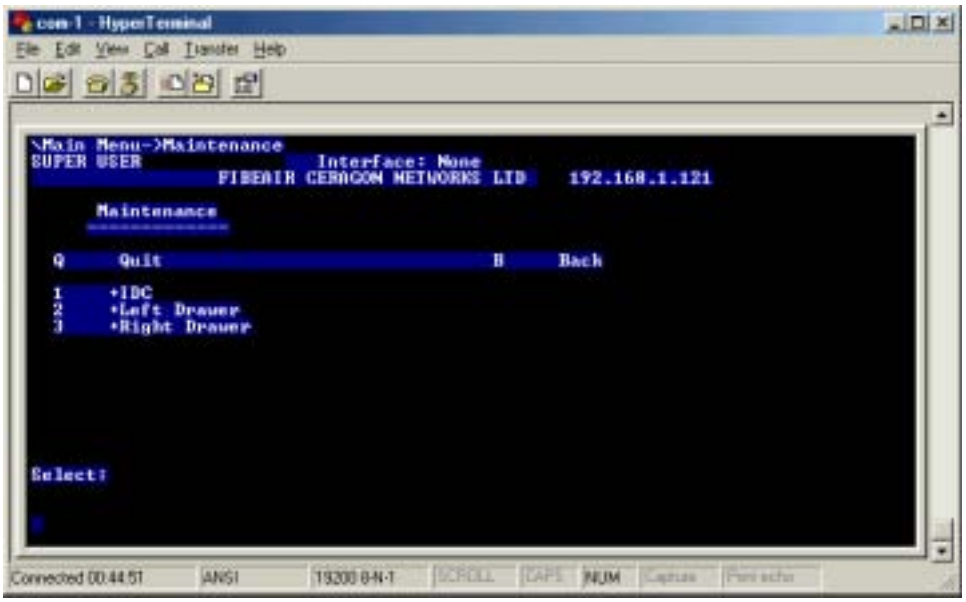


Figure 4-19 Maintenance Menu

2. Select the module on which you want to perform maintenance operations by typing the number beside it.

   The following screen appears for IDC:

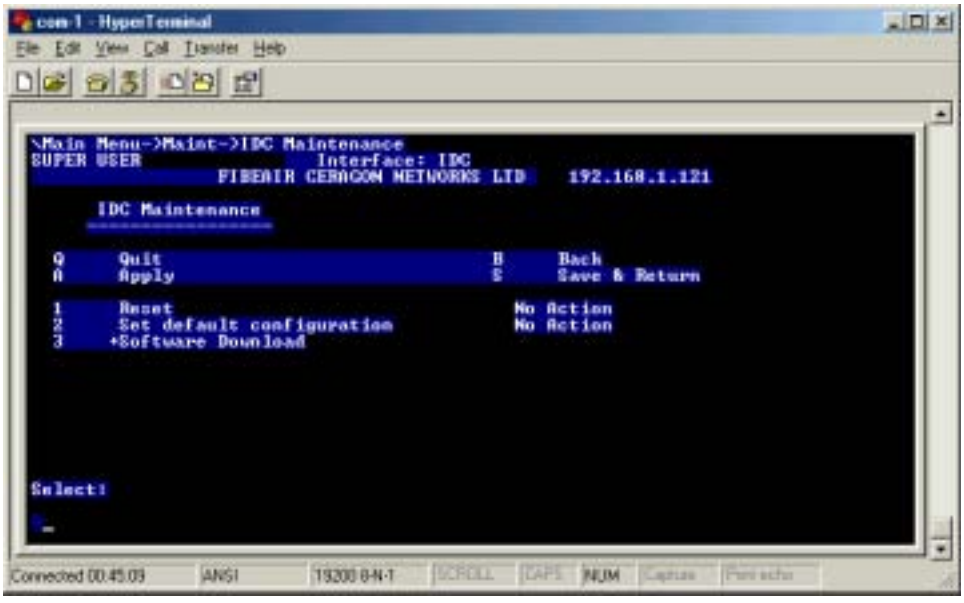

com-1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->Maint->IDC Maintenance
SUPER USER Interface: IDC
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
IDC Maintenance
Q Quit B Back
A Apply S Save & Return
1 Reset No Action
2 Set default configuration No Action
3 +Software Download
Select:
Connected 00:45:09 ANSI 19200 8-N-1 SCROLL CAPS NUM

Figure 4-20 IDC Maintenance

The following screen appears for Drawer:

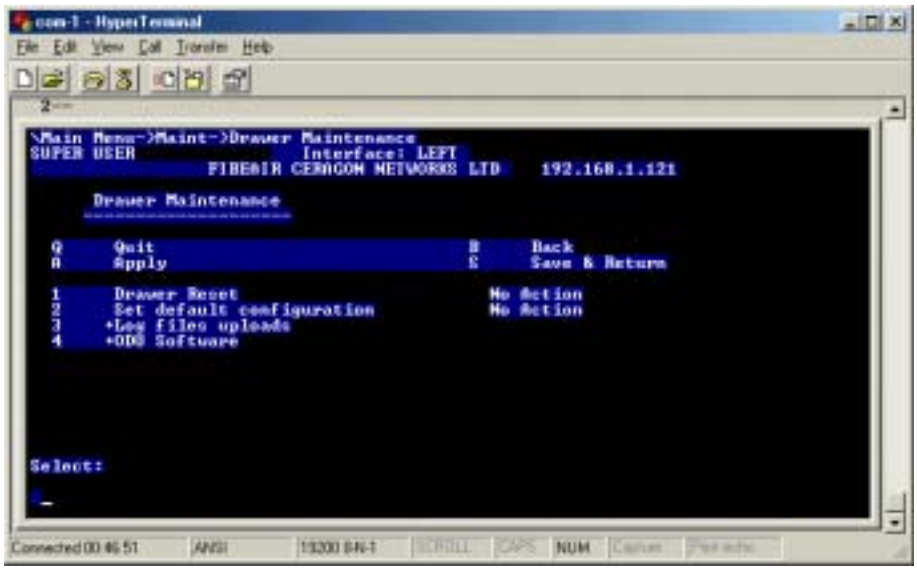

com-1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->Maint->Drawer Maintenance
SUPER USER Interface: LEFT
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
Drawer Maintenance
Q Quit B Back
A Apply S Save & Return
1 Drawer Reset No Action
2 Set default configuration No Action
3 +Log files uploads
4 +ODU Software
Select:
Connected 00:46:51 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-21 Drawer Maintenance

3. To perform a maintenance operation, type the number beside the operation, and then type the number of the desired value, or enter the value manually in the entry box that appears.

   The following screen is an example of an ODU Software Upload report.

com-1 - HyperTerminal
File Edit View Call Transfer Help
3 +I
\Main Menu->Maint->DRAW Maint->ODU Software Uploads
SUPER USER Interface: LEFT
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
ODU Software Uploads
Q Quit B Back
A Apply S Save & Return
1 Upload version number 1
2 Upload Action No Action
3 Reset No Action
4 Upload Status 255
5 Upload Counter 0
Select:
Connected 00:48:00 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-22 ODU Software Upload Report Example

Diagnostics

To perform diagnostic operations:

1. In the main menu (shown in the section *Getting Started* at the beginning of this chapter), select **4 - Diagnostics**.

   The Diagnostics menu appears.

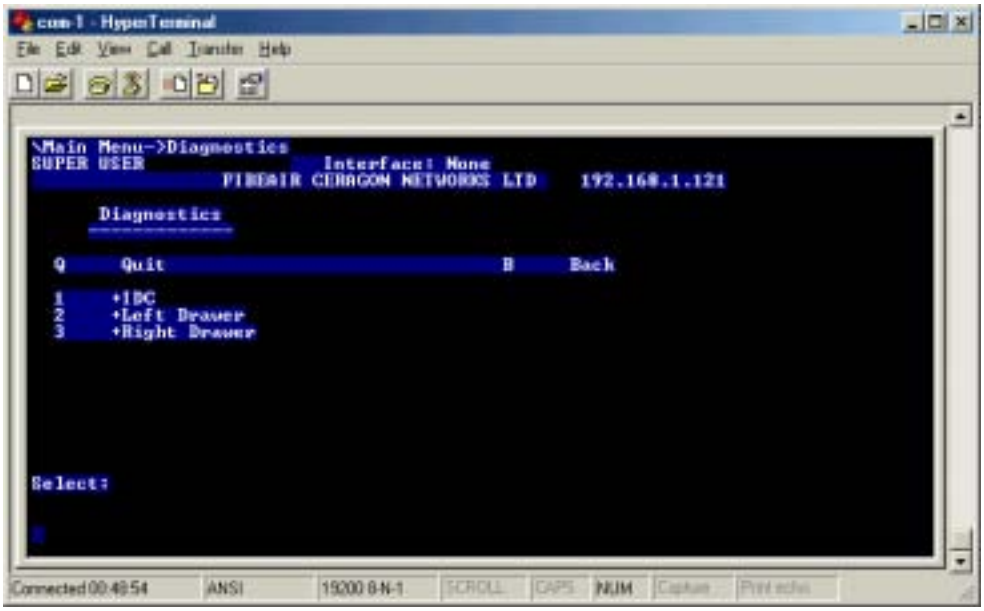


Figure 4-23 Diagnostics Menu

2. Select the module on which you want to perform diagnostics by typing the number beside it.

   The following screen appears for IDC:

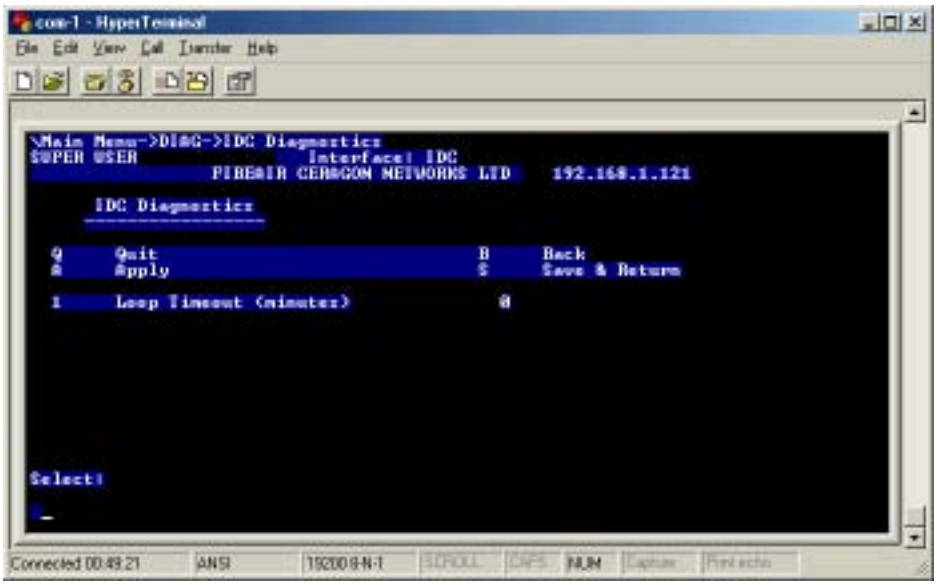

com1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->DIAG->IDC Diagnostics
SUPER USER Interface: IDC
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
IDC Diagnostics
Q Quit B Back
A Apply S Save & Return
1 Loop Timeout (minutes) 0
Select:
Connected 00:49:21 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-24 IDC Diagnostics

The following screen appears for Drawer:

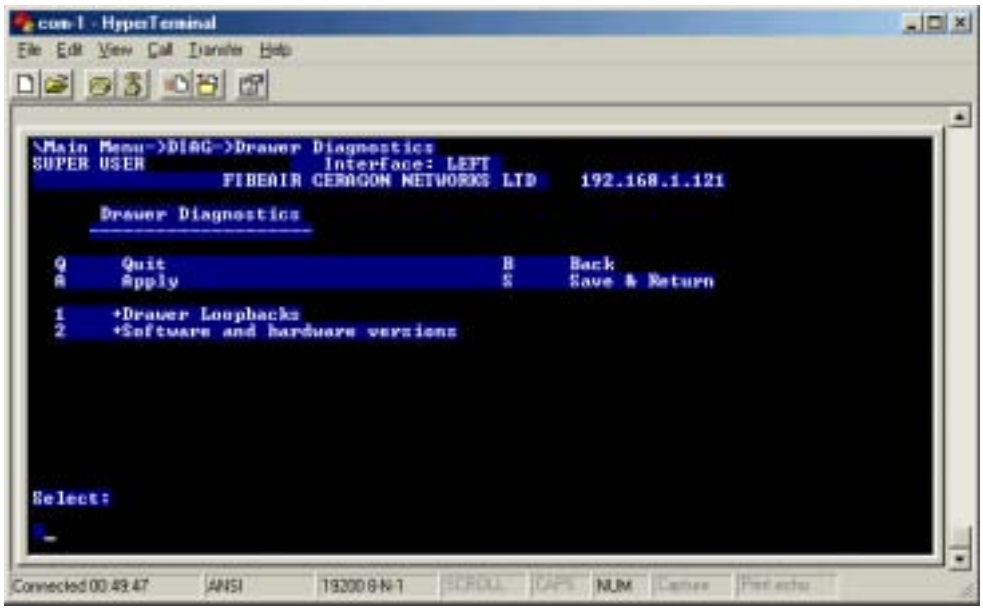


Figure 4-25 Drawer Diagnostics

3. To perform a diagnostic operation, type the number beside the operation, and then type the number of the desired value, or enter the value manually in the entry box that appears.

   The following screen is an example of the drawer loopback options.

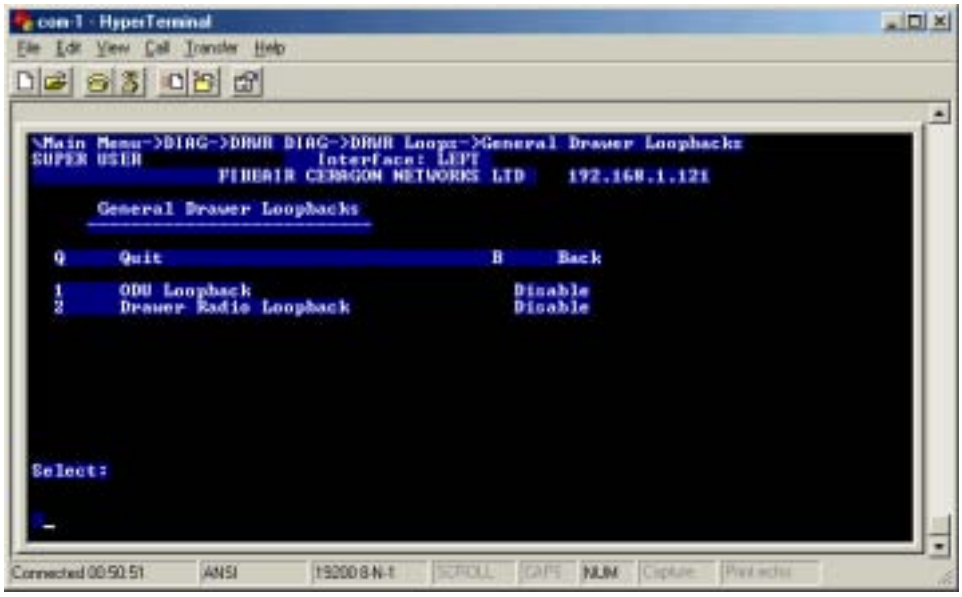

com1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->DIAG->DRWR DIAG->DRWR Loops->General Drawer Loopbacks
SUPER USER Interface: LEFT
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
General Drawer Loopbacks
Q Quit B Back
1 ODU Loopback Disable
2 Drawer Radio Loopback Disable
Select:
Connected 00:50:51 ANSI 19200 8-N-1

Figure 4-26 Drawer Loopback Options Example

Logs

To view system log reports:

1. In the main menu (shown in the section *Getting Started* at the beginning of this chapter), select **5 - Logs**.

   The Logs menu appears.

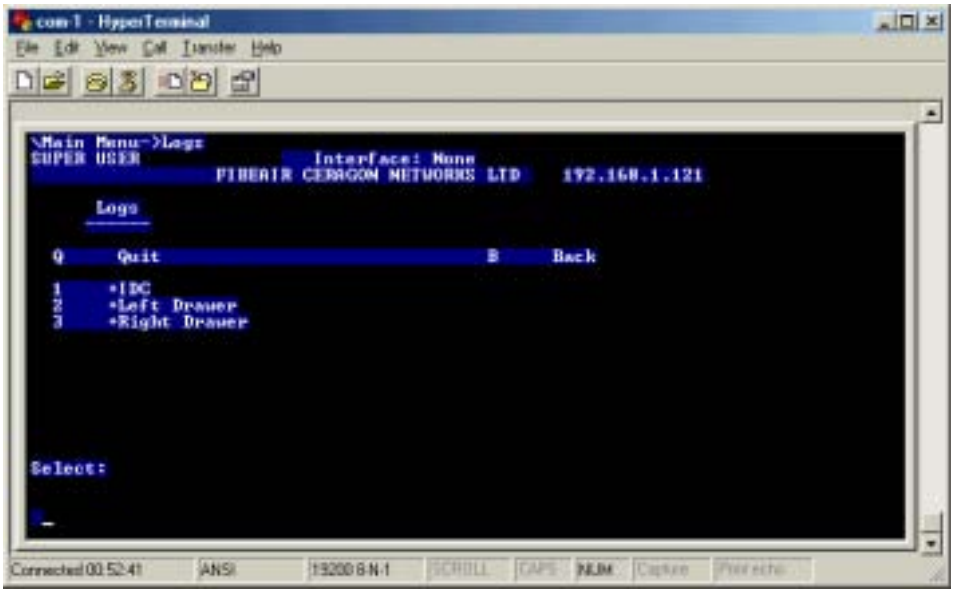


Figure 4-27 Logs Menu

2. Select the module for which you want to view log reports by typing the number beside it.

   The following screen appears for IDC:

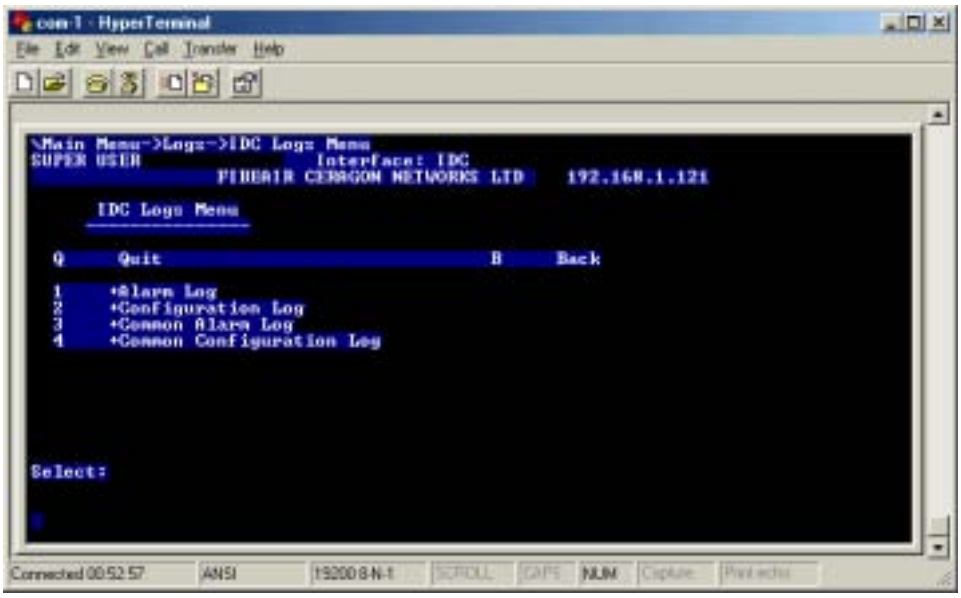

com1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->Logs->IDC Logs Menu
SUPER USER Interface: IDC
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
IDC Logs Menu
Q Quit B Back
1 *Alarm Log
2 *Configuration Log
3 *Common Alarm Log
4 *Common Configuration Log
Select:
Connected 00:52:57 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-28 IDC Log Options

The following screen appears for Drawer:

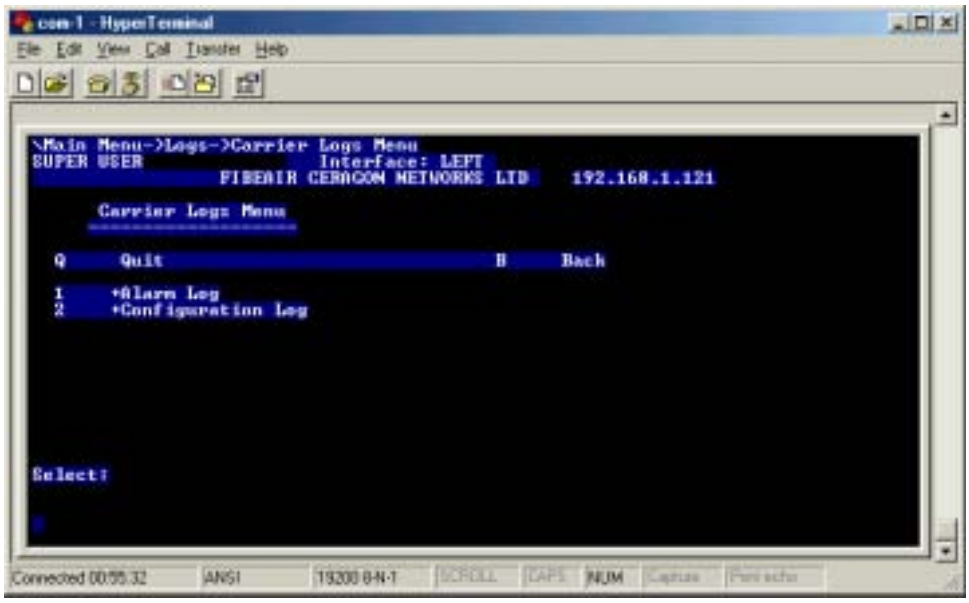

com1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->Logs->Carrier Logs Menu
SUPER USER Interface: LEFT
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
Carrier Logs Menu
Q Quit B Back
1 +Alarm Log
2 +Configuration Log
Select:
Connected 00:55:32 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-29 Drawer Log Options

3. Select the number beside the log report you want to view.

The following screen is an example of a drawer alarm log.

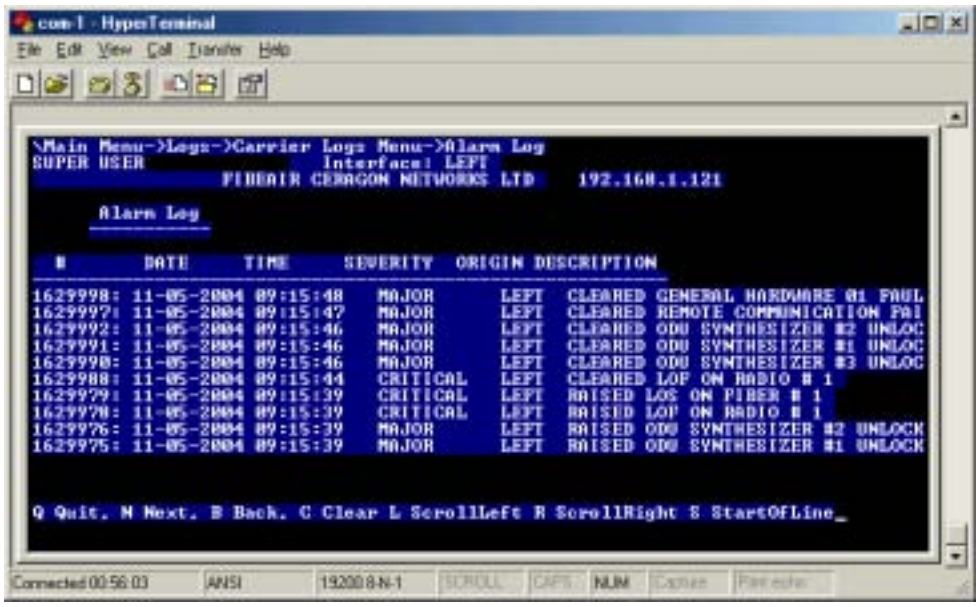

com1 - HyperTerminal
File Edit View Call Transfer Help
\Main Menu->Logs->Carrier Logs Menu->Alarm Log
SUPER USER Interface: LEFT
FIBEAIR CERAGON NETWORKS LTD 192.168.1.121
Alarm Log
DATE TIME SEVERITY ORIGIN DESCRIPTION
1629998: 11-05-2004 09:15:48 MAJOR LEFT CLEARED GENERAL HARDWARE #1 FAUL
1629997: 11-05-2004 09:15:47 MAJOR LEFT CLEARED REMOTE COMMUNICATION FAI
1629992: 11-05-2004 09:15:46 MAJOR LEFT CLEARED ODU SYNTHESIZER #2 UNLOC
1629991: 11-05-2004 09:15:46 MAJOR LEFT CLEARED ODU SYNTHESIZER #1 UNLOC
1629990: 11-05-2004 09:15:46 MAJOR LEFT CLEARED ODU SYNTHESIZER #3 UNLOC
1629988: 11-05-2004 09:15:44 CRITICAL LEFT CLEARED LOF ON RADIO # 1
1629979: 11-05-2004 09:15:39 CRITICAL LEFT RAISED LOS ON FIBER # 1
1629978: 11-05-2004 09:15:39 CRITICAL LEFT RAISED LOF ON RADIO # 1
1629976: 11-05-2004 09:15:39 MAJOR LEFT RAISED ODU SYNTHESIZER #2 UNLOCK
1629975: 11-05-2004 09:15:39 MAJOR LEFT RAISED ODU SYNTHESIZER #1 UNLOCK
Q Quit, N Next, B Back, C Clear L ScrollLeft R ScrollRight S StartOfLine_
Connected 00:56:03 ANSI 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-30 Drawer Alarm Log Example

Post Setup Procedure

After you configure the system via the terminal, you should start CeraView and perform the initial management operations described in the following sections. For a more detailed description of configuration using CeraView, see *Chapter 5 - Operation*.

Logging In

To perform management operations, start the management software as follows.

1. Select **Start ➢ Programs ➢ CeraView**.

   The Login window appears.

Figure 4-31 Login Window

2. Enter the IP address of the IDU you want to log in to, the SNMP community (for SNMP protocol access), your user name and password, and click **OK**.

   The default password for the system administrator is **ceragon**, but it can be changed later.

   After you log in, the Main CeraView window appears.

Figure 4-32 Main CeraView Window

Setting System Information

To define system information:

1. Select **File**, **Local/Remote**, **System Information**., or click the System Information icon.

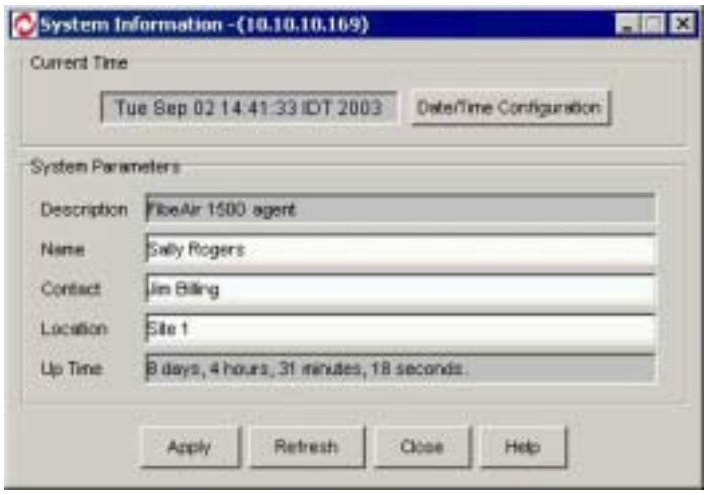


Figure 4-33 System Information Window

2. In the **Current Time** area, click **Date/Time Configuration** and set the date and time (in the format HH:MM:SS).
3. The read-only **Description** field provides information about the FibeAir system.
4. (Optional) In the **Name** field, enter a name for this link. By convention, this is the node's fully-qualified domain name.
5. (Optional) In the **Contact** field, enter the name of the person to be contacted when a problem with the system occurs. Include information on how to contact the designated person.
6. (Optional) In the **Location** field, enter the actual physical location of the node or agent.
7. The **Up Time** field, **Software Versions** area, and **Serial Numbers** area are read-only.
8. Click **Apply**. The settings are saved.
9. Click **Close**.

Local/Remote Transport Configuration (Optional)

The Local/Remote Transport Configuration window allows you to change threshold levels for the radio and alarms, and to configure special transmission parameters. This is recommended for advanced users only.

Note: You will need to restart CeraView if you change the transport protocol.

1. Select **Configuration, Local/Remote, IDU, Transport**.

   The Local/Remote Transport Configuration window appears.

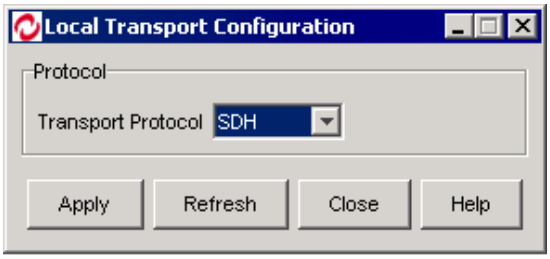


Figure 4-34 Local Transport Configuration Window

2. The **Protocol** field displays the current data transfer protocol. To change the protocol, click the drop down list and select SDH, SONET, or SONET-C.
3. Click **Apply** to save the settings.
4. Click **Close**.

Trap Forwarding Configuration

This section explains how to set up a trap forwarding plan. If your application does not require trap forwarding, you can skip the following procedure.

1. Select **Configuration**, **Local/Remote**, **Management System**, **Traps Configuration**, or click the Traps Configuration icon.

   The Trap Forwarding Configuration window appears.

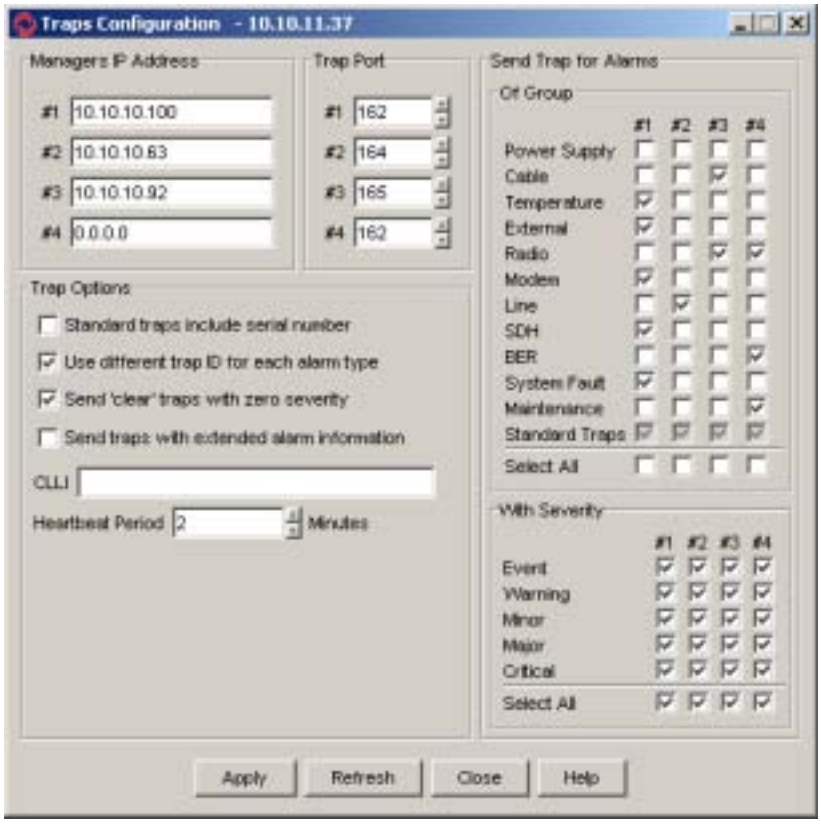


Figure 4-35 Trap Forwarding Configuration Window

2. In the **Managers IP Address** area, specify the IP addresses of the managers to which you want traps to be sent. For each manager IP you specify, specify the **Trap Port**, and for **Send Trap for Alarms with Severity**, select the severity filter to determine which types of alarms will be forwarded.

3. In the **Send Trap for Alarms of Group** section, you determine which alarms will be sent as SNMP traps to each manager. In each manager column, select the alarm types you want to include for that manager.

4. In the **Trap Options** area, select **Standard traps include serial number** if you want trap messages to include the IDU serial number.

   Select **Report local traps of far end IDU** if you want remote IDU trap messages to be reported locally.

   Select **Use different ID for each alarm type** if you want each type of alarm to receive a unique ID.

Select **Send "clear" traps with zero severity** if you want a trap with a "clear" severity (instead of the alarm's original severity) to be sent to the IP addresses you specified.

5. For **CLLI** (Common Language Location Identifier), enter up to 18 characters that will represent your system ID when traps are sent.

6. For **Heartbeat Period**, a heartbeat signal will be generated every x minutes (the number you enter) to tell your system that the trap meachnism is working.

7. Click **Apply** to save the settings.

8. Click **Close**.

External Alarms Setup

The procedure detailed in this section is required only if alarms generated by external equipment are connected to the IDU, or if the IDU alarm outputs are connected to other equipment (using the alarms I/O connector).

1. Select **Configuration**, **Local/Remote**, **IDU**, **External Alarms**, or click the **Local/Remote External Alarms** icon.

   The Local/Remote Input/Output External Alarms window appears.

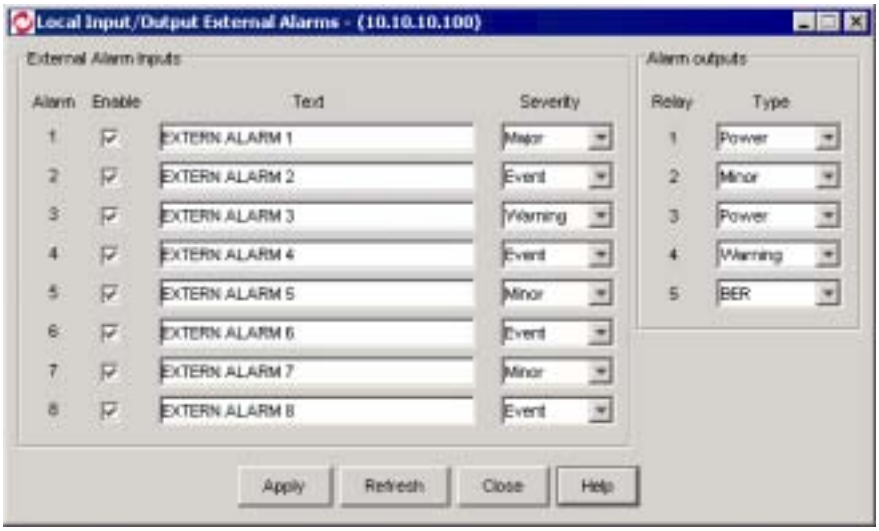


Figure 4-36 Local Input/Output External Alarms Window

Follow the steps below for both the Local and Remote sides.

The microcontroller in the IDU reads alarm inputs (dry contact) and transmits them to the CeraView management system. This allows FibeAir to report external alarms that are not related to its own system.

For each alarm on the left side of the window, do the following:

2. Click on the box next to the alarm number to enable/disable the alarm.
3. If you enable an alarm, enter a description of the alarm in the text field.
4. Select the alarm's severity level from the drop-down list (Major, Minor, Warning, or Event).

5. FibeAir provides five alarm outputs (three for FibeAir 1500P) that can be used by other systems to sense FibeAir alarms. The outputs are configured on the right side of the window.

   The alarm outputs are Form C Relays. Each output relay provides three pins, as follows:

   Normally Open (NO)

   Normally Closed (NC)

   Common (C)

   Output alarms can be defined as any one of the following:

   Major
   Minor
   Warning
   External
   Power
   BER
   Line
   Loopback
   LOF
   IDU
   ODU
   Cable
   Remote

   The default alarm output setting for each relay is “Power”.

   The relays may be connected to customer-specific applications. Refer to Appendix B for details concerning the alarm connector pin assignments.

6. After you complete the configuration, click **Apply** to save the settings.
7. Click **Close**.

Line Interface Connection

After configuring the system in accordance with the previous sections, the Line Interfaces can be connected to the IDU.

For a description of all available FibeAir line interfaces, see Chapter 8.

Note the following interface terminology:

- For connectors or signals labeled TX, the signals are sent from FibeAir.
- For connectors or signals labeled RX, the signals are sent to FibeAir.

Chapter 5
Operation

General

This chapter explains how Ceragon's CeraView management software is used to configure and monitor FibeAir systems.

System Requirements

The following are system requirements for the CeraView management software.

For Windows:

Specification	Minimum	Recommended
Hardware Type	Any type	-------
Processor	Pentium 4, 1.2 GHz	Pentium 4, 2.4 GHz or higher
Memory (RAM)	128 MB	256 MB
Available Drive Space	200 MB	1 GB
Operating System	Windows 98/NT/2000/ME/XP	-------
Display Monitor	800x600, 16,384 colors	1024x768, True Color
Serial Port	RS-232 (HyperTerminal)	-------
Ethernet Ports	1	-------

For UNIX:

Specification	Minimum	Recommended
Hardware Type	Blade 100, Ultra 5	Ultra 10
Memory (RAM)	256 MB	512 MB
Available Drive Space	200 MB	1 GB
Operating System	Solaris 2.7 or higher	Solaris 2.8 or higher
Display Monitor	800x600, 16,384 colors	1024x768, True Color
Ethernet Ports	1	-------

Installation

CeraView installation is a simple *plug-and-play* process that takes just a few minutes.

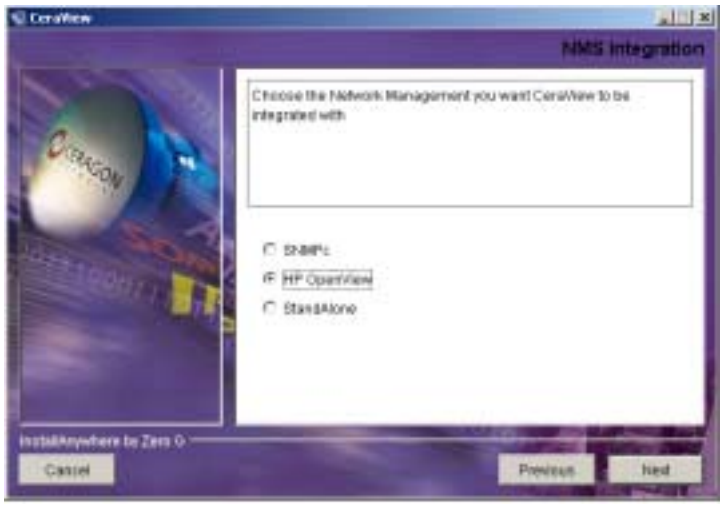
This section provides CeraView installation procedures for different platforms.

Installation for HP OpenView

To install CeraView for HP OpenView:

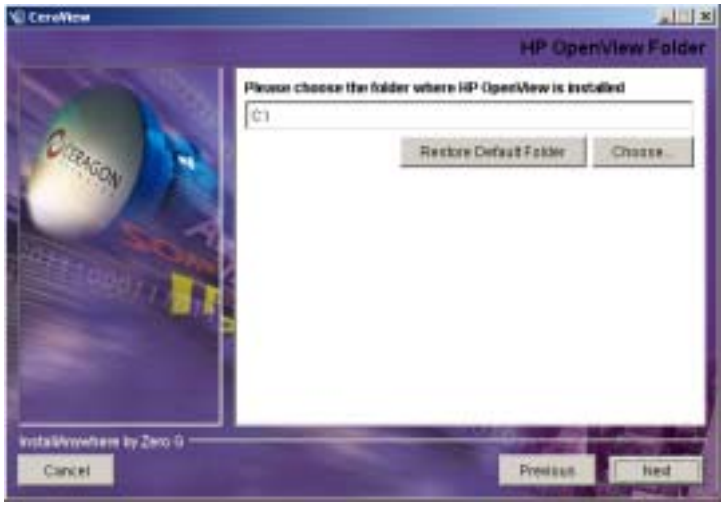
1. Run the CeraView installation program provided with the CeraView software.

   The NMS platform selection window appears.



2. Select **HP OpenView** and click **Next**.

   The HP OpenView directory location window appears.



3. Click **Choose** and select the directory in which HP OpenView was installed.

   If you want to restore the system-selected default directory, click **Restore Default Folder**.

4. Click **Next**.

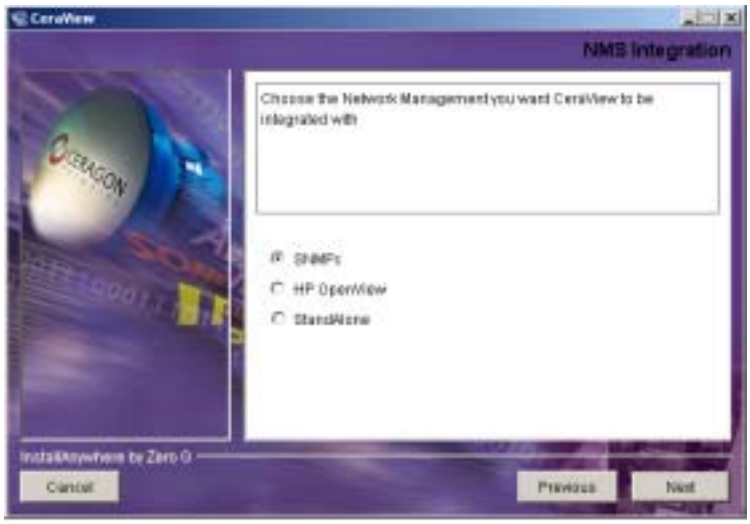
   CeraView integration files are installed in the HP OpenView directory.

Installation for SNMPc

To install CeraView for SNMPc:

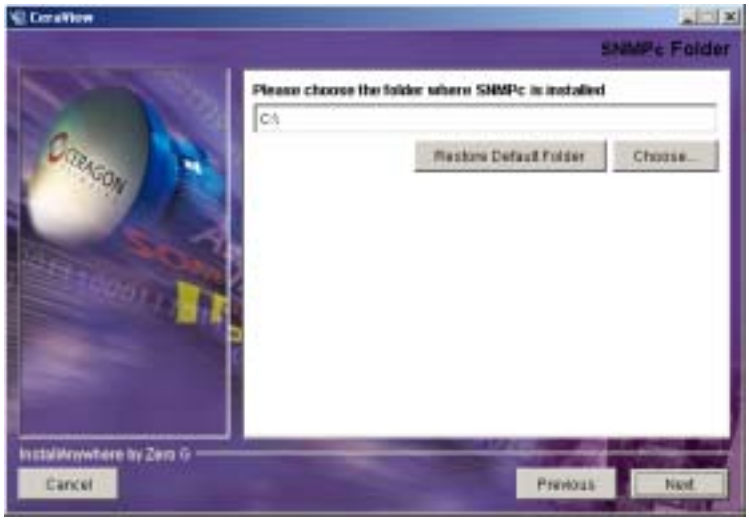
1. Run the CeraView installation program provided with the CeraView software.

   The NMS platform selection window appears.



2. Select **SNMPc** and click **Next**.

   The SNMPc directory location window appears.



3. Click **Choose** and select the directory in which SNMPc was installed.

   If you want to restore the system-selected default directory, click **Restore Default Folder**.

4. Click **Next**.

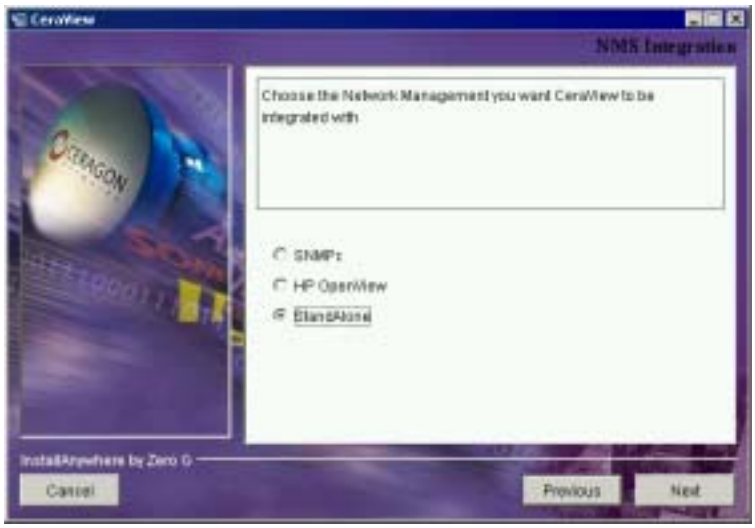
   CeraView integration files are installed in the SNMPc directory.

Installation for Standalone

To install CeraView as a standalone platform:

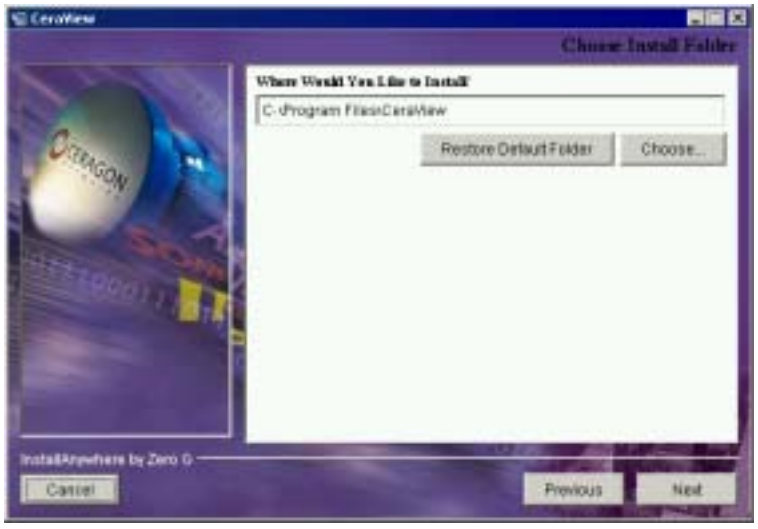
1. Run the CeraView installation program provided with the CeraView software.

   The NMS platform selection window appears.



2. Select **Standalone** and click **Next**.

   The Standalone directory location window appears.



3. Click **Choose** and select the directory in which you want to install the CeraView software.

   If you want to restore the system-selected directory, click **Restore Default Folder**.

4. Click **Next**.

   CeraView files are installed in the directory you specified.

CeraView Configuration

Before you run CeraView, you can configure the way CeraView will operate and to which servers it will connect.

CeraView configuration is performed using the CeraView Configuration utility, as follows:

Click **Start** on the desktop, and select **Programs**, **CeraView**, **CeraView Config**.

The CeraView Configuration utility main window appears.

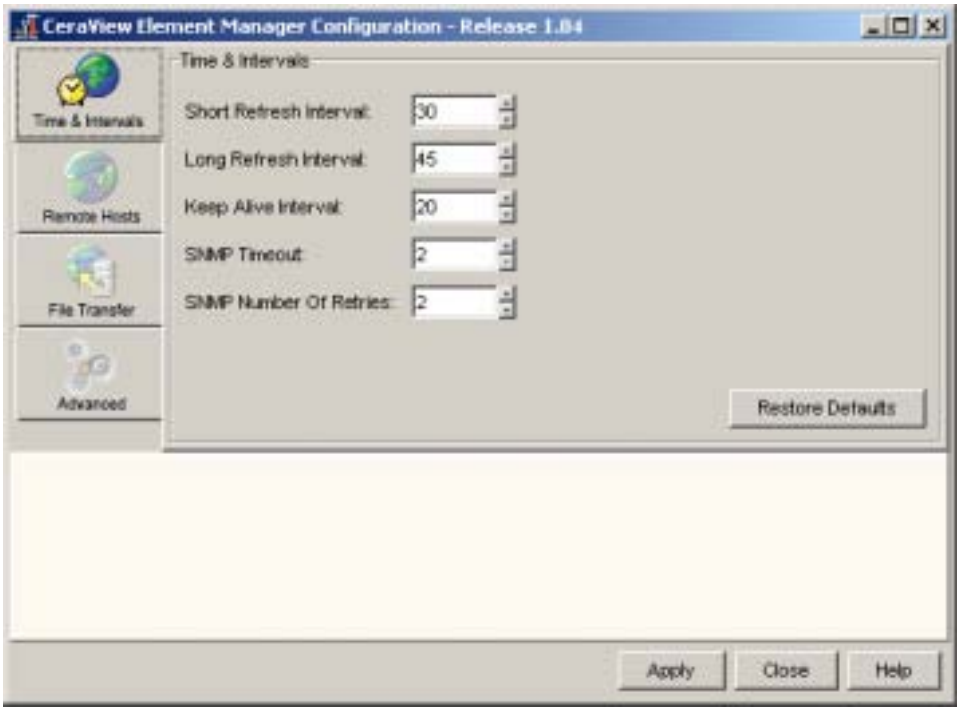


Figure 5-1 CeraView Configuration Utility Main Window

The CeraView Configuration utility is divided into the following sections:

- Time and Intervals
- Remote Hosts
- File Transfer Configuration
- Advanced

To open a section, click on its icon on the left side of the window.

In each section, if you want to restore default values, click **Restore Defaults**.

Each section is described in the following paragraphs.

Time and Intervals

In the Time and Intervals section, you can configure the following:

Short Refresh Interval	The value (seconds) determines how often windows that require frequent refreshing will be refreshed.
Long Refresh Interval	The value (seconds) determines how often windows that do not require frequent refreshing will be refreshed.
Keep Alive Interval	The value (seconds) determines how often the network element will be checked for connectivity.
SNMP Timeout	The value (seconds) determines the maximum time the system will wait after an SNMP command before timing out.
SNMP Number of Retries	The value determines the maximum number of times a request will be made to an element after a timeout.

Remote Hosts

In the Remote Hosts section, you can configure the following:

Logger Host Address	The IP or host name of the logger server. If left blank, logging will be disabled.
Logger Port Number	The number of the port from which the logger will receive data.
Security Server Host Address	CeraView's Security Server IP or host name. Leave this field blank if CeraView security is run locally.
Security Server Port Number	The number of the port from which the Security Server will receive data.

File Transfer Configuration

In the File Transfer Configuration section, you can configure the following:

TFTP Server Address	Trivial File Transfer Protocol server IP. You must enter an IP associated with your PC.
TFTP Files Location	The directory in which the network element software files are located. If you installed PolyView, make sure the same location is specified in the PolyView configuration.
TFTP Timeout	The value (seconds) determines when the TFTP server will time out after a request.
TFTP Retries	The value (seconds) determines the maximum number of times a TFTP request will be made to an element after a timeout.
Use Internal TFTP Server	Select True if you are using an intrenal TFTP server. Select False if you are using an external TFTP server. If you installed PolyView on this PC, select False, since PolyView uses its own TFTP server.

Advanced Configuration

In the Advanced Configuration section, you can configure the following:

VC Calculation from KLM	For ADM tributary paths. Defines the formula used to calculate the VC (Virtual Container) from the KLM values.
Use Metric Display	Select True if you want values to be displayed in metric units.
SNMP Default Write Community	The default SNMP write community. Leave this field blank if you didn't change the SNMP write community value in the network element configuration.
Select Interface Language	The language in which the CeraView application will appear.

CeraView Security

This section explains how to set up CeraView security.

Starting the Security Application

To start the CeraView Security Application, in the **Start** menu on your desktop, select **Programs**, **CeraView**, **CeraView Security**.

The Security application main window appears.

Figure 5-2 CeraView Security Application Main Window

Using the Security Application

Security for CeraView is obtained by creating users and user groups with designated access rights to the different CeraView components.

Note that upon installation, two users and two groups are created, as follows:

Users:

Admin - Always placed in the Admin group

Viewer - Initially placed in the Observer group

Groups:

Admin - Full access

Observer - Read-only access

The administrator can add new users and groups, and modify existing ones, but cannot rename or delete the Admin user or group.

Creating a New User

To create a new CeraView user:

1. In the main window (shown above), click **Users**, and select **Add User**.

   The User Configuration window appears

Figure 5-3 CeraView Security Application User Configuration Window

2. Enter the new user's name and password in the fields at the top of the window.
3. In the **Access by Subnet** area, you can assign different access rights to the new user according to subnet. For example, you can give the user Administrator rights on one subnet and Observer rights on another.

   Notes:

   * You cannot enter the same subnet twice for the same user.
   * If none of the subnets you entered match an IP the user tries to connect to, the user will be denied access to that IP.
   * If more than one subnet matches an IP the user tries to connect to, the group that belongs to the subnet that matches the IP the closest will be used for the IP access.

     For example, you created the user "Joe" with the following rights: 172.24.0.0 : Observer, and 172.24.30.0 : Administrator. If Joe requests access to 172.24.30.5, he will be granted Administrator rights for that IP. Even though both subnets you assigned to Joe match the IP he requested, the subnet 172.24.30.0 is closer to the IP than the other one.

     In order to obtain default Observer rights for IP addresses that do not match any of the subnets in the list, you need to assign the subnet 0.0.0.0 : Observer to the user, and the subnet mask must also be 0.0.0.0.
4. Click **OK**.

Working with Users

Once you create users, you can perform several user-related operations.

To perform a user-related operation:

1. In the main window, expand the **Users** list, and click the name of a user you want to work with.
2. In the **Edit** menu, select **Configure User** to modify the user configuration.

   The User Configuration window appears (shown above in the section *Creating a New User*).
3. Change the user configuration as desired in accordance with the explanation provided in the *Creating a New User* section above.
4. Select **Copy User** if you want to duplicate the user you selected.

   The Copy User window appears.

Figure 5-4 CeraView Security Application Copy User Window

   Enter the new user's name and password, and click **OK**. A new user will be created with the same access rights as the user you chose to copy.
5. Select **Delete User** if you want to delete the user you selected.

   Note that you cannot delete the Admin user.
6. To import users from an external file to your current CeraView session, in the main window select **File**, **Import Users**.

   To export users from your current CeraView session to a different CeraView session, in the main window select **File**, **Export Users**.

Creating a New User Group

User groups can be assigned collective rights to different CeraView components.

To create a new group of users:

1. In the main window, click **Groups**, and in the **Edit** menu select **Add read-only Group** or **Add read-write Group**.

   If you select Read-Only Group, initially the group will only have read-only access rights. If you select Read-Write Group, initially the group will have read-write access rights.
2. Enter the name of the group in the window that appears, and click **OK**.

Working with Groups

Once you create groups, you can perform several group-related operations.

To perform a group-related operation:

1. In the main window, expand the **Groups** list, and click the name of the group you want to work with.
2. In the **Edit** menu, select **Configure Group** if you want to rename the group.

   Note that you cannot rename the Admin group.
3. Select **Copy Group** if you want to duplicate the group you selected.

   In the Copy Group window that appears, enter the group's name, and click **OK**. A new group will be created with the same access rights as the group you chose to copy.
4. Select **Delete Group** if you want to delete the group you selected.

   Note that you cannot delete the Admin group.
5. For each group, to configure access rights for specific CeraView components, double-click the key icon beside the component name.

   The Access Rights window appears.

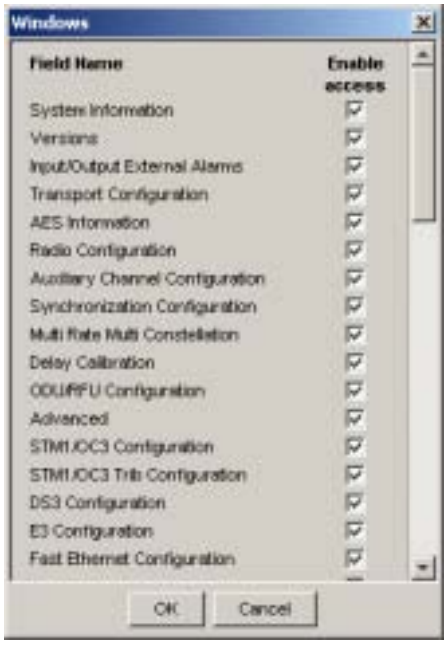


Figure 5-5 Example of Security Application Access Rights Window

Mark the checkboxes of each CeraView component you want the group to have access to, and click **OK**.

Trap Forwarding Configuration Utility

This utility is used to configure Trap Forwarding from Ceragon's NMS to other NMS systems.

To configure traps sent from a Network Element to the NMS system, see the *Trap Forwarding* section in the *Management System* menu description.

To start the utility, click **Start** on the desktop, and select **Programs**, **CeraView**, **Trap Forwarding Config**.

The Trap Forwarding Configuration Utility main window appears.

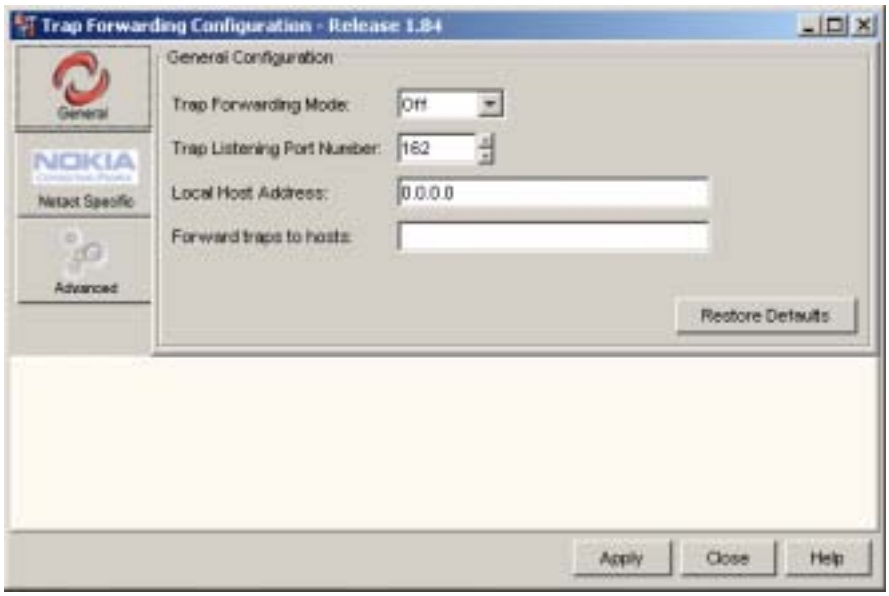


Figure 5-6 Trap Forwarding Configuration Utility General Parameters Window

The following sections are available by clicking on the appropriate icon on the left side of the window:

Used to set general trap forwarding parameters, such as the forwarding mode, trap listening port number, and others.

Used to set trap forwarding parameters specific to Nokia's NetAct application.

Used to set advanced trap forwarding parameters, such as receive trap logger disable/enable, and others.

General

Click the General Trap Forwarding Configuration icon . The General section of the Trap Forwarding Configuration window appears (shown above).

In the **Trap Forwarding Mode** field, select one of the following options:

Off - Disables trap forwarding.

Regular - Forwards the trap exactly as it was received.

Nokia - Translates the trap for Nokia's NetAct application.

In the **Trap Listening Port Number** field, select the trap listening port. The standard port is 162. Change this number if it is already being used by another SNMP service. In addition, remember to configure the network elements to send traps to the correct port.

In the **Local Host Address** field, enter the IP address or name of the local host. Leave the value 0.0.0.0 to bind all IP addresses.

In the **Forward Traps to Hosts** field, enter a list of host names and port numbers to which traps will be forwarded. Use the format <host IP>:<port>.

To reset the parameters to their original vaues, click **Restore Defaults**.

Nokia NetAct

Click the Nokia NetAct Trap Configuration icon to set NetAct-related trap forwarding parameters.

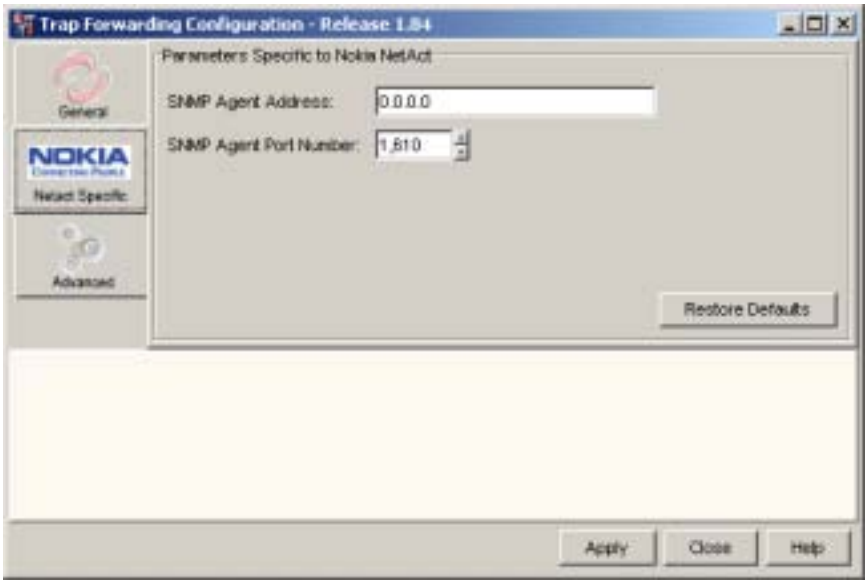


Figure 5-7 Trap Forwarding Configuration Utility Nokia NetAct Parameters Window

In the **SNMP Agent Address** field, enter the NetAct agent IP address.

In the **SNMP Agent Port Number** field, enter the NetAct agent port.

To reset the parameters to their original vaues, click **Restore Defaults**.

Advanced

Click the Advanced Trap Configuration icon to set advanced trap forwarding parameters.

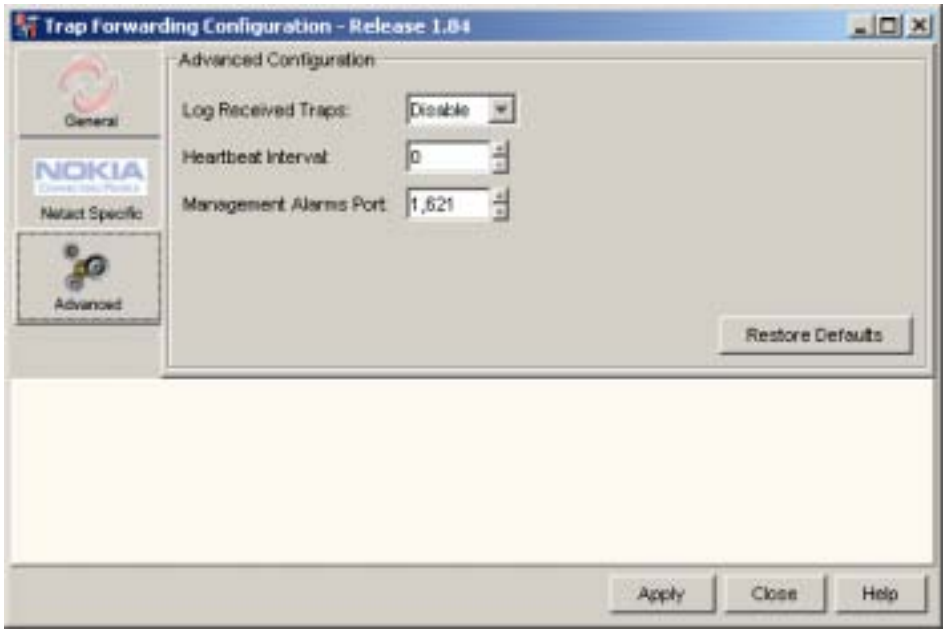


Figure 5-8 Trap Forwarding Configuration Utility Advanced Parameters Window

In the **Log Received Traps** field, select **Enable** to log received traps in a file, or **Disable** to de-activate the logger. Note that enabling this option may result in slower trap processing, and even the loss of some traps. The option should be only be used for short periods, generally for system debugging.

In the **Heartbeat Interval** field, if you specify a value, a heartbeat trap will be generated every x minutes (the number you enter in the field) to tell your system that the trap mechanism is working. The value 0 means that a heartbeat trap will never be sent.

In the **Management Alarms Port** field, specify the internal port used to send management alarms to the trap forwarding mechanism.

To reset the parameters to their original values, click **Restore Defaults**.

Logging in to CeraView

Note: For Windows 2000/XP, the user on the local PC must be defined as an *Administrator*, which can be done as follows:

1. In the **Control Panel**, double-click **Users and Passwords**.
2. Click **Add**.
3. Click **Browse**, and select the user from the list.
4. Click **Next**.
5. Select **Other** and **Administrators**.
6. Click **Finish**.

There are different ways to log in to CeraView depending on how you set up access to the program during the installation procedure.

If you chose to add CeraView to the **Start** menu on the desktop, use the following method.

To log in to CeraView:

1. Select **Start**, **Programs**, **CeraView**, **CeraView**.

   The Login window appears.

Figure 5-9 CeraView Login Window

2. Enter the relevant information in the fields.

   The default Administrator login is:

   User Name: admin
   Password: ceragon

   The default Viewer login is:

   User Name: viewer
   Password: viewer

   Mark the **Save Password** box if you want CeraView to remember the user name and password you entered.

3. Click **OK**.

CeraView for FibeAir 1500/1528

The following sections describe the CeraView application for FibeAir 1500/1528. A description of CeraView for other FibeAir products is provided in the relevant section in this chapter.

Main Window

The Main window is your starting point for all operations.

Below is a description of the menus, toolbars and other features of the Main window.

Figure 5-10 Main Window

Title Bar

The Title Bar displays the CeraView version and the IP address of the IDU being accessed.

Active/Standby

The Active/Standby tabs appear for protected (1+1) systems. You can click on the tabs to configure the respective units.

Menu Bar

The Menu Bar contains menus and menu items used to perform CeraView operations.

Toolbar

The Toolbar includes several icons that you can click to perform different operations.

Each icon in the Toolbar is described below.

Icon	Operation
	System Information - used to view and define system information, such as contact personnel and system up time.
	Trap Forwarding Configuration - used to designate managers to which traps will be forwarded.
	Current Alarms - used to view current active alarms.
	Alarm Log - used to view hisorical alarm records.
	External Alarms - used to configure alarms sent to/from external sources.
	ODU Configuration - used to configure the ODU.
	Loopback - used to configure and run loopbacks for testing and troubleshooting.
	Online Help - used to view the online help file.

Physical View

Physical views of the FibeAir local and remote units are displayed in the Main window. The views provide a real-time virtual display of the IDU front panel.

Figure 5-11 Physical View in Main Window

The LEDs that appear in the physical view indicate the actual real-time status of the LEDs on the front panel of the IDU. (LED changes on the actual front panels of the units will be updated in the physical views after a slight delay.)

The LEDcolors are as follows:

Green - indicates proper operation

Yellow - indicates a warning

Red - indicates a major alarm or severe malfunction

The following table lists the LEDs and their indications.

LED	Color			Description
	Red	**Yellow**	**Green**	
Power	X		X	**Red** - power supply problem, system not functional
Line	X	X	X	**Red** - no input to main channel / High BER **Yellow** - J0 mismatch / BER
LOF (Loss of Frame)	X		X	**Red** - radio did not recognize information frame (radio link problem/radio LOF)
BER (Bit Error Ratio)	X	X	X	**Red** - radio BER higher than radio excessive error threshold definition (see Sonet/SDH configuration window) **Yellow** - radio BER higher than radio signal degrade threshold definition (see Sonet/SDH configuration window)
LPBK (Loopback)	X		X	**Red** - loopback is active
STBY (Standby)		X	X	**Yellow** - Protected configuration. The unit is currently passive or Tx mute is operating
IDU	X	X	X	**Red** - modem unlocked / link ID mismatch **Yellow** - high temperature / fan problem
ODU	X	X	X	**Red** - no link / ODU power / ODU unlocked **Yellow** - radio interference / high temperature / Rx/Tx out of range
CBL (Cable)	X		X	**Red** - IF cable open / IF cable short
RMT (Remote Unit)	X	X	X	**Red** - no link / remote unit problem (red LED is lit in the remote unit) **Yellow** - warning in remote unit (yellow LED is lit in the remote unit)

LED Indications for Hitless Systems

For Hitless systems the following table lists the LEDs and their indications:

LOF (LED Panel) - LOF

LED Color	Alarm Explanation
Yellow	Local unit receives LOF from a receive path currently *not* in use.
Red	Local unit receives LOF from a receive path currently in use.

LOF (Interface Panel) - ALRM

LED Color	Alarm Explanation
OFF	Hitless mode is disabled.
Red	Local unit receives LOF from the mate unit.
Green	Hitless switching can be performed, if necessary.

Local Receiver (Interface Panel) - Rx ACTV

LED Color	Alarm Explanation
OFF	Local receiver not in use.
Green	Local receiver in use.

Menus

The following sections describe the CeraView window menus.

File Menu

System Information

This option allows you to view and define information for the FibeAir system.

1. Select **File**, **Local/Remote**, **System, Information**., or click the System Information icon.

   The System Information window appears.

Figure 5-12 System Information Window

2. In the **Current Time** area, click **Date/Time Configuration** and set the date and the time (in the format HH:MM:SS).
3. The read-only **Description** field provides information about the FibeAir system.
4. (Optional) In the **Name** field, enter a name for this link. By convention, this is the node's fully-qualified domain name.
5. (Optional) In the **Contact** field, enter the name of the person to be contacted when a problem with the system occurs. Include information on how to contact the designated person.
6. (Optional) In the **Location** field, enter the actual physical location of the node or agent.
7. The **Up Time** field is read-only and shows how long the system has been operating continuously.
8. Click **Apply** to save the settings.
9. Click **Close**.

Versions

The Versions window displays current software versions and relevant serial numbers. It also displays software versions that will take effect after the unit is reset.

1. Select **File**, **Local/Remote**, **System**, **Versions**.

   The Versions window appears.

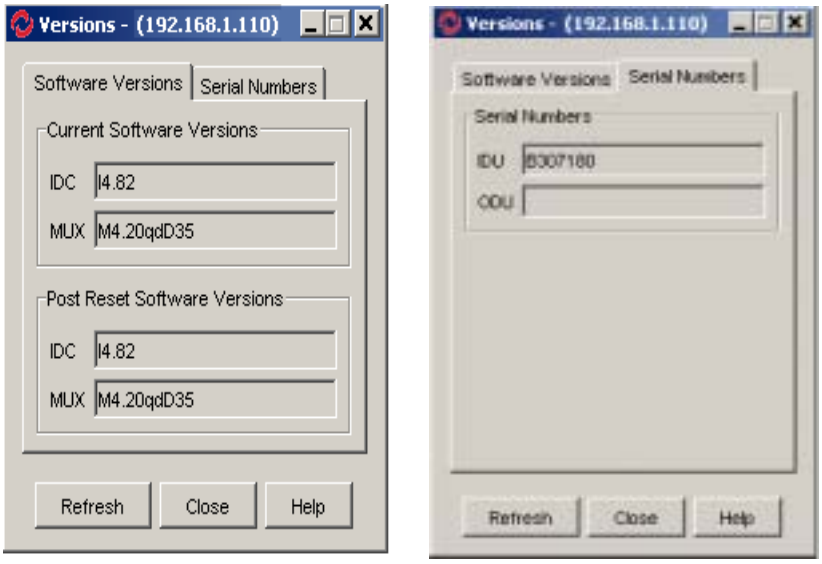


Figure 5-13 Versions Window

2. Click the **Serial Numbers** tab for a list of component serial numbers.

Configuration Report

This option generates a report that includes various parameters and their values, such as system description, software versions, and Tx/Rx frequencies.

1. Select **File, Local/Remote, Configuration Report**.

   The Local/Remote Configuration Report window appears.

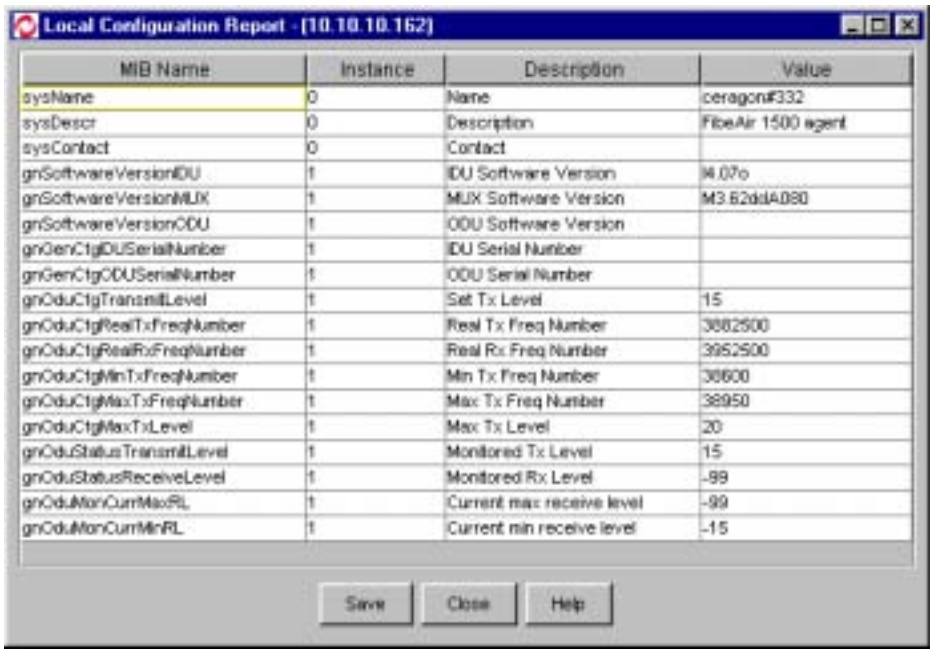

Local Configuration Report - (10.10.10.162)
MIB Name
Instance
Description
Value
sysName 0 Name ceragon#332
sysDescr 0 Description FibeAir 1500 agent
sysContact 0 Contact
gnSoftwareVersionIDU 1 IDU Software Version
gnSoftwareVersionMUX 1 MUX Software Version
gnSoftwareVersionODU 1 ODU Software Version
gnGenCfgIDUSerialNumber 1 IDU Serial Number
gnGenCfgODUSerialNumber 1 ODU Serial Number
gnOduCfgTransmitLevel 1 Set Tx Level 15
gnOduCfgRealTxFreqNumber 1 Real Tx Freq Number 3882500
gnOduCfgRealRxFreqNumber 1 Real Rx Freq Number 3952500
gnOduCfgMinTxFreqNumber 1 Min Tx Freq Number 38600
gnOduCfgMaxTxFreqNumber 1 Max Tx Freq Number 38950
gnOduCfgMaxTxLevel 1 Max Tx Level 20
gnOduStatusTransmitLevel 1 Monitored Tx Level 15
gnOduStatusReceiveLevel 1 Monitored Rx Level -99
gnOduMonCurrMaxRL 1 Current max receive level -99
gnOduMonCurrMinRL 1 Current min receive level -15
Save
Close
Help

Figure 5-14 Configuration Report Window

2. Click **Save** to save the report in a file for analysis or downloading.

Configuration File Upload/Download

This option enables you to upload a configuration file from a FibeAir unit to the management module, or download a file from the management module to the FibeAir unit.

1. Select **File**, **Local/Remote**, **Configuration File, Upload from Element/Download to Element**.

   The Upload Configuration File or Download Configuration File window appears.

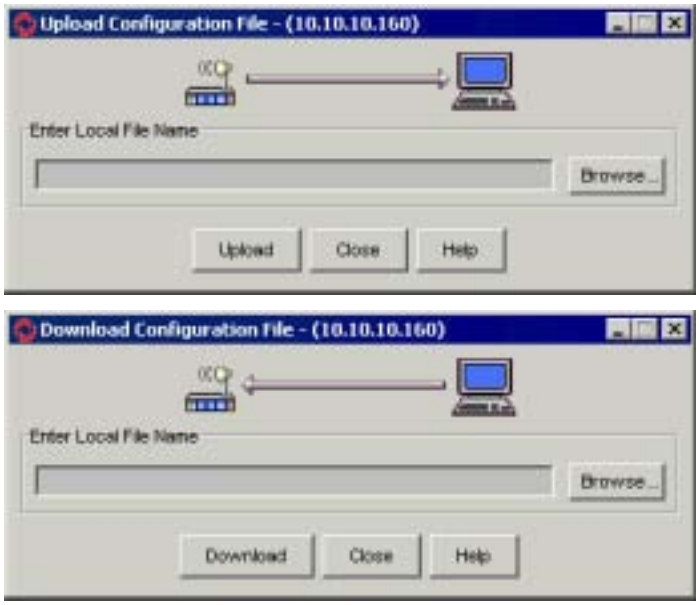


Figure 5-15 Upload/Download Configuration File Windows

2. Click **Browse**, locate the configuration file you want to use, and click **Upload** or **Download**.

After the file is uploaded or downloaded, changes will take place only after the unit is reset.

Software Download

This option enables you to download IDU, ODU, and MUX software updates.

1. Select **File, Local/Remote**, **Software Download**.

   A window appears for you to define the software download procedure.

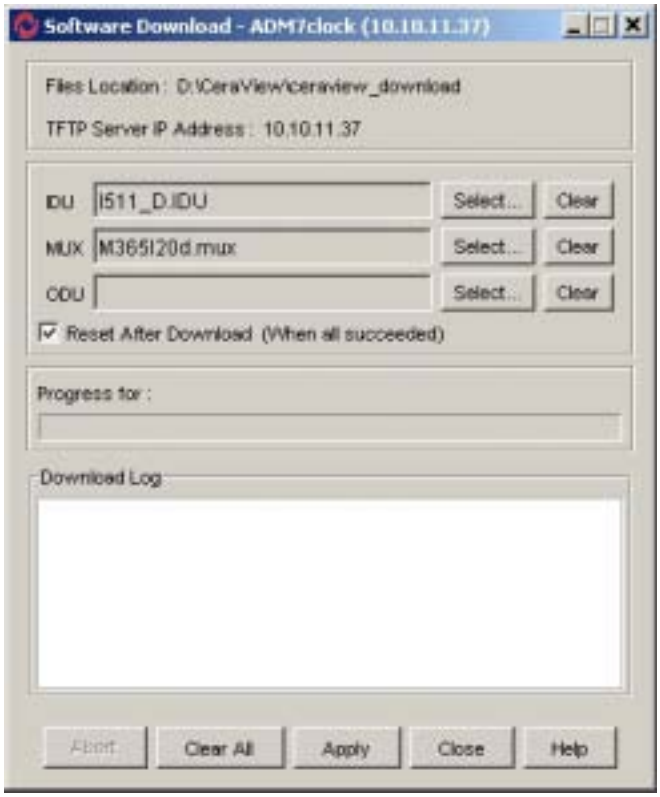


Figure 5-16 Software Download Window

   The **Files Location** field shows the directory in which the software files are located.

   The **TFTP Server IP Address** field shows the IP of the TFTP server used to download the software.

2. Click **Select** to choose the software file you want to download.

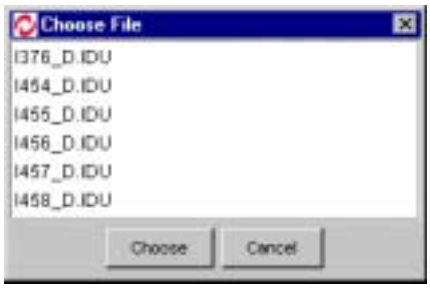


Figure 5-17 Software File Selection Window

3. Select the file you want, and click **Choose**.

4. Select **Reset After Download** if you want the unit to reset after the software is successfully downloaded.
5. In the Software Download window, click **Apply**.

   The software file you chose is downloaded and a progress report appears in the Download Log area.

New Session

Select this item to log in for a new CeraView session. The new session will appear in addition to the current session.

When you select this item, the CeraView login window appears for you to specify the IP address of the FibeAir unit you want to access.

Exit

Select this item to exit the CeraView application. You can also exit by clicking on the Close icon (x) in the title bar.

When you exit CeraView, you will be prompted to confirm the exit. Click **OK** to confirm the operation.

Configuration Menu

IDU

External Alarms

The procedure detailed in this section is required only if alarms generated by external equipment are connected to the IDU, or if the IDU alarm outputs are connected to other equipment (using the alarms I/O connector).

1. Select **Configuration**, **Local/Remote**, **IDU**, **External Alarms**, or click the **External Alarms** icon.

   The Local/Remote External Alarms window appears.

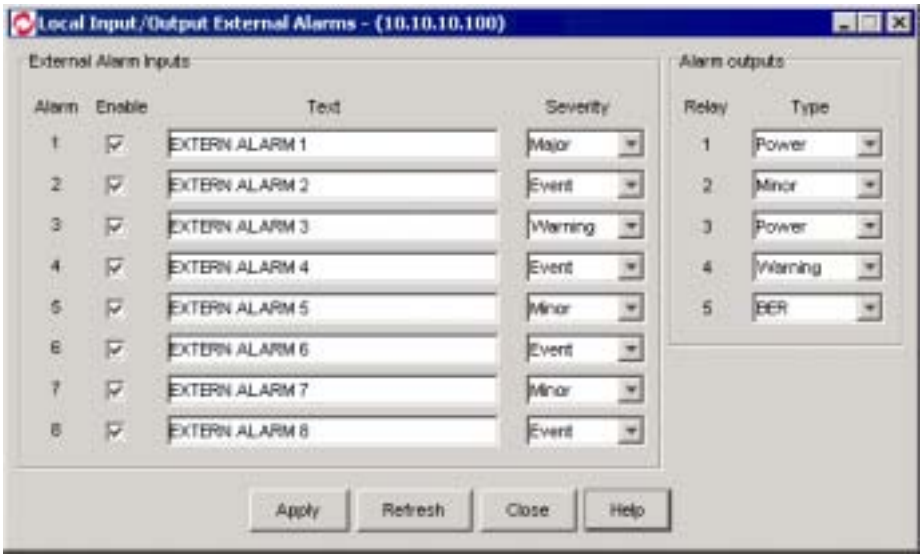


Figure 5-18 External Alarms Window

Follow the steps below for both the Local and Remote sides.

The microcontroller in the IDU reads alarm inputs (dry contact) and transmits them to the CeraView management system. This allows FibeAir to report external alarms that are not related to its own system.

For each alarm on the left side of the window, do the following:

2. Click on the box next to the alarm number to enable/disable the alarm.
3. If you enable an alarm, enter a description of the alarm in the text field.
4. Select the alarm's severity level from the drop-down list (Major, Minor, Warning, or Event).
5. FibeAir provides five alarm outputs that can be used by other systems to sense FibeAir alarms. The outputs are configured on the right side of the window.

   The alarm outputs are Form C Relays. Each output relay provides three pins, as follows: Normally Open (NO), Normally Closed (NC), Common (C).

   Output alarms can be defined as Major, Minor, Warning, External, Power, BER, Line, Loopback, LOF, IDU, ODU, Cable, or Remote.

   The default alarm output setting for all relays is "Power".

The relays may be connected to customer-specific applications. Refer to Appendix B for details concerning the alarm connector pin assignments.

6. After you complete the external alarm configuration, click **Apply** to save the settings.
7. Click **Close**.

Transport

The Transport Configuration window allows you to select the communication protocol for the link. This is recommended for advanced users only.

1. Select **Configuration, Local/Remote**, **IDU, Transport**.

   The Transport Configuration window appears.

Figure 5-19 Transport Configuration Window

2. The **Transport Protocol** field displays the current data transfer protocol. To change the protocol, click the drop down list and select either SDH, SONET, or SONET-C.
3. Click **Apply** to save the settings.
4. Click **Close**.

Auxiliary Channel

The Auxiliary Channel window allows you to select an additional channel for secondary communication across the link.

1. Select **Configuration, Local/Remote**, **IDU, Auxiliary Channel**.

   The Auxiliary Channel Configuration window appears.

Figure 5-20 Auxiliary Channel Configuration Window

2. Select the Wayside, EOW, or User Channel if you will be using those channels.

   EOW - Engineering Order Wire

   User Channel - 64 Kbps

ODU

1. Select **Configuration**, **Local/Remote**, **ODU**, or click the ODU Configuration icon.

   The ODU Configuration window appears.

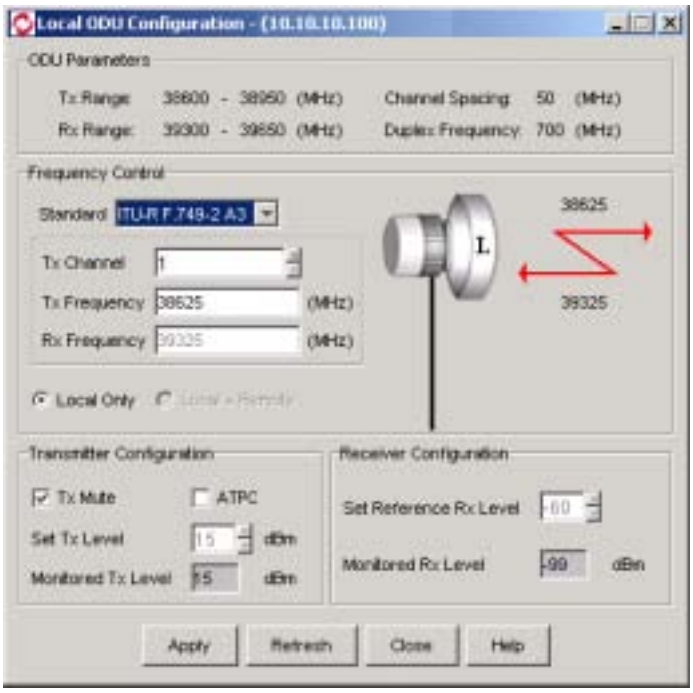


Figure 5-21 ODU Configuration Window

2. The **ODU Parameters** area is read-only.
3. In the **Frequency Control** area, select **Local Only** if you want to set the frequency only for the local side. Select **Local + Remote** to set the frequency for both sides of the link. (The Local + Remote option is available only when the link is operational.)
4. For **Tx Channel**, click the up/down arrows to select the frequency channel you want to use.
5. For **Tx Frequency,** enter the frequency at which the system will transmit.
6. The **Rx Frequency** field is read-only for frequencies above 8 GHz.

   For 7/8 GHz, values must be entered in the field.
7. In the **Transmitter Configuration** area, select **Tx Mute** to block transmission to the remote unit. By default, this option is not selected.

   Select **ATPC** to activate the Automatic Transmit Power Control feature.

   For **Set Tx Level**, enter or select the designated signal level. Possible range is -10 to max power level. By default, the transmit signal level is set to the maximum power level.

   The **Monitored Tx Level** field (read-only) displays the system's transmitted power level.
8. In the **Receiver Configuration** area, the **Set Reference Rx Level** field should be set to the desired Rx level in ATPC mode.

   The **Monitored Rx Level** field (read-only) displays the received power level.

9. Click **Apply** to save the settings.
10. Click **Close** to close the window.

Interfaces

Note: Different interfaces are configured in different windows. Select the interface you want in accordance with the procedure below, and configure it as desired. Below are two examples of interface configuration.

STM-1

1. Select **Configuration**, **Local/Remote**, **Interfaces**, **STM-1**.

   The STM-1 Configuration window appears.

Figure 5-22 STM-1 Interface Configuration Window

2. In the **Excessive Error** field, select the level above which a line Excessive BER alarm is issued for errors detected over the radio link.
3. In the **Signal Degrade** field, select the level above which a line Signal Degrade alarm is issued for errors detected over the radio link.
4. The **BER** field is read-only.
5. In the **Local Fiber STM1** field, select **Enabled** to activate the interface with alarm generation. If Enabled is not selected, the channel will operate, but no alarms will be generated.
6. In the **Regenerator Section Trace Identifier** area, select **J0 Operation** to use the J0 byte as a trace identifier in the SDH RSOH.

   If you activate J0, use the **Transmitted J0** and **Expected J0** fields to define the IDU identifier string.

   Select **Send AIS on RS TIM** if you want Alarm Indication Signals to be sent in the event of RS TIM (Trace Identification Mismatch).
7. Click **Apply** to save the settings.
8. Click **Close** to close the window.

Radio

1. Select **Configuration**, **Local/Remote**, **Interfaces**, **Radio**.

   The STM-1 Configuration window appears.

Figure 5-23 Radio Interface Configuration Window

2. In the **Excessive Error** field, select the level above which an Excessive BER alarm is issued.
3. In the **Signal Degrade** field, select the level above which a Signal Degrade alarm is issued.
4. The **BER** field is read-only.
5. For **Link ID**, enter the ID of the link you are working with.

   Note: When working with an IDU that has the LINK ID feature on one end and an IDU that does not have this feature on the other end, set the LINK ID to 1.
6. Click **Apply** to save the settings.
7. Click **Close** to close the window.

Management System

IP Configuration

1. Select **Configuration**, **Local/Remote**, **Management System**, **IP Configuration**.

   The IP Configuration window appears.

Figure 5-24 IP Configuration Window

2. In the **Ethernet Addresses** area, specify the **Ethernet IP Mask** and **Default Router IP Address**.
3. In the **Serial NMS** area, specify the **IP Mask**, **Baud Rate**, and **Modem Phone Number**.
4. Click **Apply** to save the changes.
5. Click **Close**.

Trap Forwarding

1. Select **Configuration**, **Local/Remote**, **Management System**, **Trap Forwarding**, or click the Trap Forwarding icon.

   The Trap Forwarding Configuration window appears.

Figure 5-25 Trap Forwarding Configuration Window

2. In the **Managers IP Address** area, specify the IP addresses of the managers to which you want traps to be sent. For each manager IP you specify, specify the **Trap Port**, and for **Send Trap for Alarms with Severity**, select the severity filter to determine which types of alarms will be forwarded.
3. In the **Send Trap for Alarms of Group** section, you determine which alarms will be sent as SNMP traps to each manager. In each manager column, select the alarm types you want to include for that manager.
4. In the **Trap Options** area, select **Standard traps include serial number** if you want trap messages to include the IDU serial number.

   Select **Report local traps of far end IDU** if you want remote IDU trap messages to be reported locally.

   Select **Use different ID for each alarm type** if you want each type of alarm to receive a unique ID.

   Select **Send "clear" traps with zero severity** if you want a trap with a 'clear' severity (instead of the alarm's original severity) to be sent to the IP addresses you specified.
5. For **CLLI** (Common Language Location Identifier), enter up to 18 characters that will represent your system ID when traps are sent.
6. For **Heartbeat Period**, a heartbeat signal will be generated every x minutes (the number you enter) to tell your system that the trap meachnism is working.
7. Click **Apply** to save the settings.
8. Click **Close**.

NTP Configuration

NTP (Network Time Protocol) configuration is performed when an NTP server is used to synchronize network activity.

1. Select **Configuration**, **Local/Remote**, **Management System**, **NTP**.

   The NTP Configuration window appears.

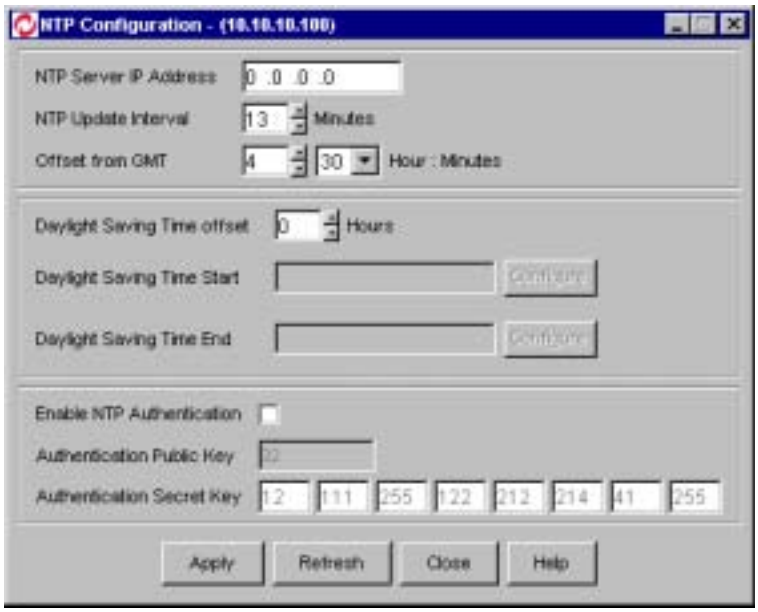


Figure 5-26 NTP Configuration Window

2. Enter the IP of the NTP server.

3. For **NTP Update Interval**, use the up/down arrows to select the amount of time (minutes) between synchronization updates.
4. For **Offset from GMT**, use the arrow buttons and the drop-down list to select the amount of time required to compensate for offset from the GMT (Greenwich Mean Time).
5. For **Daylight Saving Time Offset**, click the arrow buttons to set the amount of time required to compensate for daylight saving.
6. For **Daylight Saving Time Start**, click **Configure** to set the beginning of the daylight saving time period.
7. For **Daylight Saving Time End**, click **Configure** to set the end of the daylight saving time period.
8. Select **Enable NTP Authentication** for secure access to the NTP server.

   If you enable NTP, enter the **Authentication Public Key**, and the **Authentication Secret Key** numbers.
9. Click **Apply** to save the settings.
10. Click **Close** to close the window.

In-band Configuration

In-band configuration is performed when you want to work with In-band Management. In-band Management refers to a method whereby the network management software sends management packets through the same network it is managing. This differs from out-of-band management in which the network management software uses a different network (overlay network) in order to communicate with the managed elements.

1. Select **Configuration**, **Local/Remote**, **Management System**, **In-band**.

   The In-band Configuration window appears.

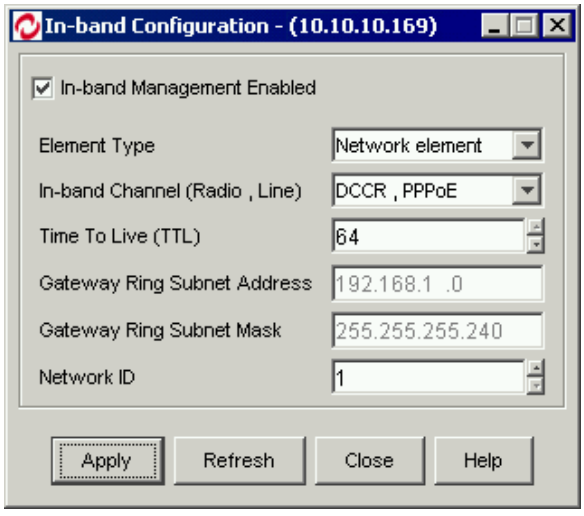


Figure 5-27 In-band Configuration Window

2. Select **In-band Management Enabled** to activate In-band management.
3. For **Element Type**, click the drop-down list and select the desired element (Network Element or Gateway).
4. For **In-band Channel**, click the drop-down list and select the channel you want to use.

5. For **Time To Live (TTL)**, use the up/down arrows to select the desired value.
6. The **Gateway Ring Subnet Address** and **Gateway Ring Subnet Mask** fields are read-only.
7. For **Network ID**, use the arrow buttons to select the desired value.
8. Click **Apply** to save the settings.
9. Click **Close** to close the window.

SNMP Configuration

1. Select **Configuration**, **Local/Remote**, **Management System**, **SNMP Configuration**.

   The SNMP Configuration window appears.

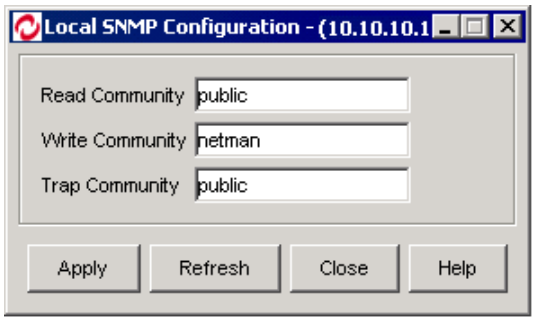


Figure 5-28 SNMP Configuration Window

2. For **Read Community**, enter the community name for read-only access.

   For **Write Community**, enter the community name for read-write access.

   For **Trap Community**, enter the community name for trap forwarding.
3. Click **Apply** to save the settings.
4. Click **Close** to close the window.

Note: Changes to community settings will take effect only after the unit is reset.

Alarms Menu

Current Alarms

1. Select **Alarms**, **Local/Remote**, **Current Alarms**, or click the Current Alarms icon.

   The Current Alarms window appears.

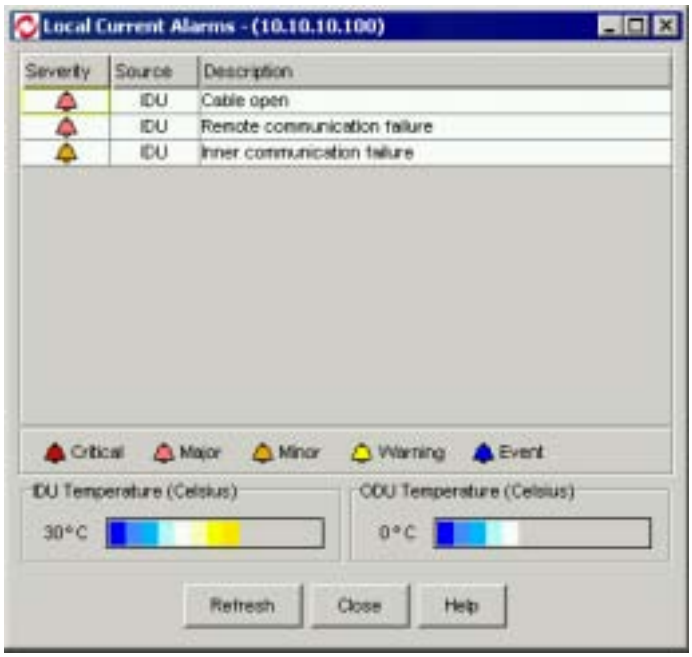


Figure 5-29 Current Alarms Window

Each line in the window describes a different alarm.

The source of the alarm appears in the **Source** column.

The color in the **Severity** column indicates the severity of the alarm, as shown in the window at the bottom of the alarm list.

In addition to the current alarms, the current IDU and ODU temperatures are shown at the bottom of the window. (The ODU temperature will not appear if the ODU is disconnected.)

Alarm Log

1. Select **Alarms**, **Local/Remote**, **Alarm Log**, or click the Alarm Log icon.

   The Alarm Log window appears.

Alarm Log - (10.10.10.169)
Severity Filter
Critical
Major
Minor
Warning
Event
Time and Date
Severity
Description
25-Aug-03 10:09:27 IDU POWER 8v FAIL CLEARED
25-Aug-03 10:09:27 IDU POWER 5v FAIL CLEARED
25-Aug-03 10:09:27 IDU POWER 3.3v FAIL CLEARED
25-Aug-03 10:09:27 IDU POWER -5v FAIL CLEARED
25-Aug-03 10:09:27 IDU CABLE IS OPEN
25-Aug-03 10:09:27 IDU REMOTE COMMUNICATION FAIL RAISED
17-Aug-03 05:41:09 IDU POWER 8v FAIL CLEARED
17-Aug-03 05:41:09 IDU POWER 5v FAIL CLEARED
17-Aug-03 05:41:09 IDU POWER 3.3v FAIL CLEARED
17-Aug-03 05:41:09 IDU POWER -5v FAIL CLEARED
17-Aug-03 05:41:09 IDU CABLE IS OPEN
17-Aug-03 05:41:09 IDU REMOTE COMMUNICATION FAIL RAISED
06-Aug-03 07:08:26 IDU POWER 8v FAIL CLEARED
06-Aug-03 07:08:26 IDU POWER 5v FAIL CLEARED
06-Aug-03 07:08:26 IDU POWER 3.3v FAIL CLEARED
06-Aug-03 07:08:26 IDU POWER -5v FAIL CLEARED
Clear Log
Save
Refresh
Close
Help

Figure 5-30 Alarm Log Window

The Alarm Log window displays the following information:

Time - The time the alarm was triggered.

Date - The date the alarm was triggered.

Severity - The severity of the alarm. You can determine which severity levels will be displayed in the window by selecting the levels at the top of the window.

Description - A description of the alarm, and its status (RAISED, CLEARED).

Note: You can click on a column title to sort the information in the table accordingly.

To clear the alarm list in the window, click **Clear Log**.

To save the current alarm list in a file, click **Save**.

To close the window, click **Close**.

Continuous Alarm Logging

To save alarms in a continuous logging file, select **Alarms**, **Local/Remote**, **Start Saving Log**.

In the Choose Alarm Log File window that appears, select the file you want to save the alarms to and click **Save**.

Alarms will be added to the file you selected until you select **Stop Saving Log**. If you want to exit CeraView, and the log file is still active, you will be warned about the active file.

Performance Menu

Radio

RSL

The RSL Performance Monitoring window displays received signal level values measured over the past 24 hours.

1. Select **Performance**, **Local/Remote**, **Radio**, **RSL**.

   The RSL Monitoring window appears.

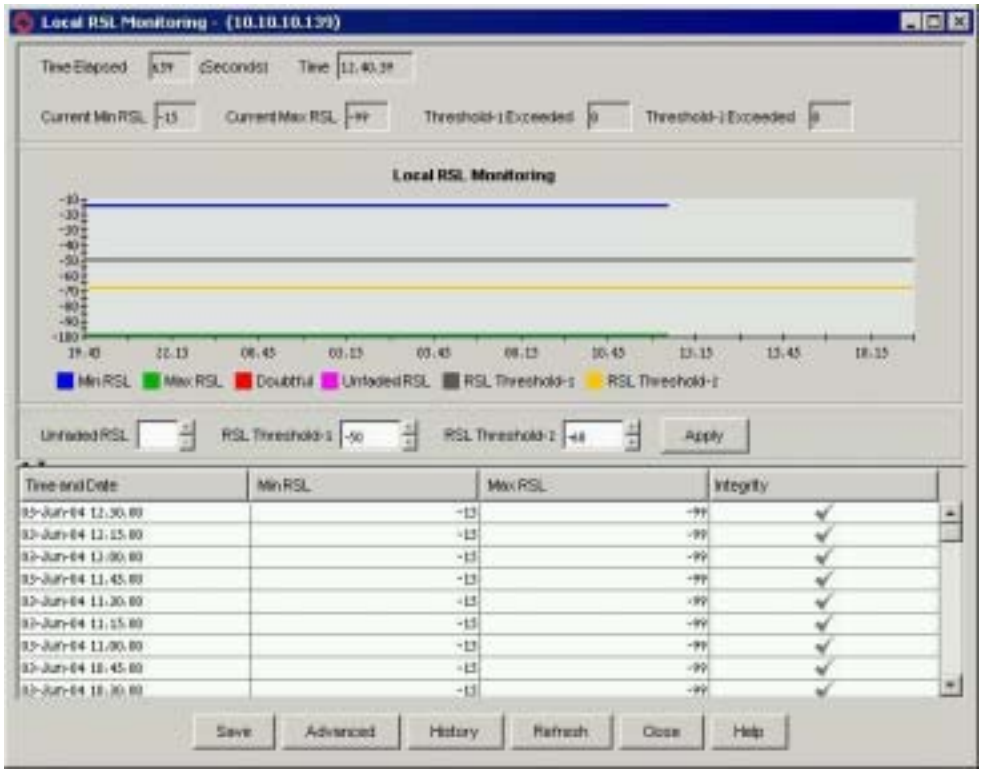


Figure 5-31 RSL Monitoring Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes). The Threshold Exceeded counters at the top of the window display the number of seconds threshold values were exceeded during the current interval.

Current Min RSL values are the minimum received level measured during the interval.

Current Max RSL values are the maximum received level measured during the interval.

Unfaded RSL is the theoretical expected RSL value (not the actual value), which can be calculated by the user (as a function of distance, frequency, etc.). The value is used only for reference purposes.

RSL Threshold 1 and RSL Threshold 2 are values that you can set. When an RSL value exceeds the thresholds you set, the Threshold Exceeded counters at the top of the PM window will display the number of seconds the threshold values were exceeded.

Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

The monitoring table displays RSL values over the last 24 hours. The values are the same as those that appear in the graph, only in table format.

The Min RSL column shows the minimum received level measured during the interval.

The Max RSL column shows the maximum received level measured during the interval.

The Integrity column indicates whether or not the values received at that time and date are reliable. A red x icon in the column indicates that the values are not reliable due to a possible power surge or power failure event that occurred at that time. (This column corresponds to the Doubtful indication in the graphic window.)

Click Advanced for the additional Threshold 1 Exceeded and Threshold 2 Exceeded columns, which list the number of times RSL thresholds specified in the main RSL Monitoring window were exceeded.

2. To view daily RSL values over a one-month period, click **History**.

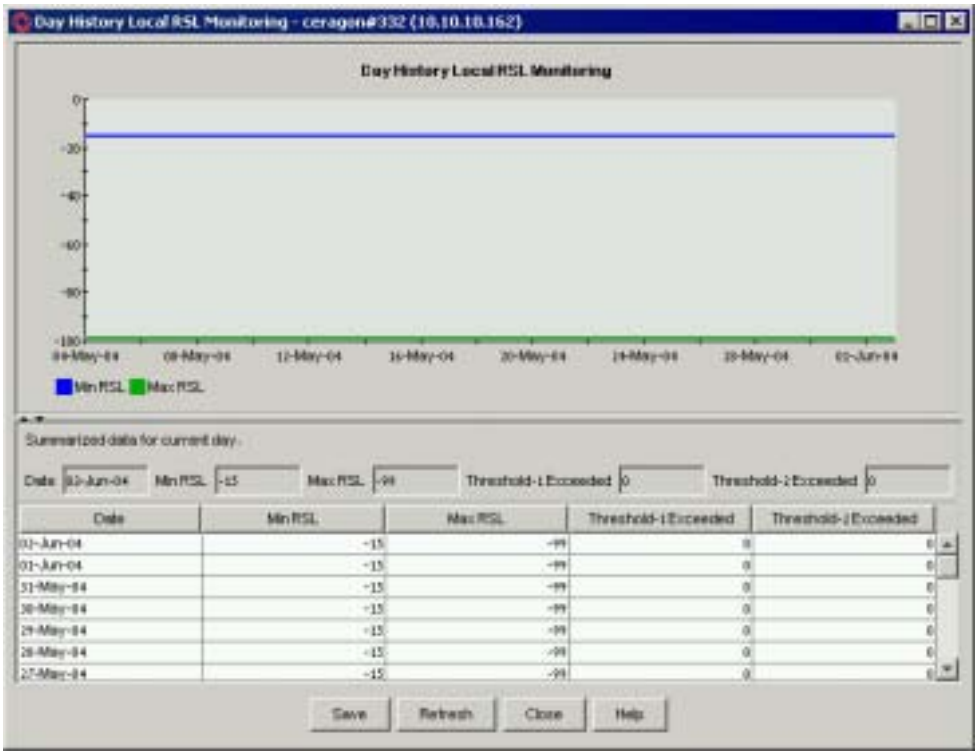


Figure 5-32 RSL History Window

The values shown in the window are values that were received over the last 30 days.

Note: Since the current day's data is not complete until the end of the day, its partial data is presented above the main table area.

Click **Save** to save current values in the table to a file.

TSL

The TSL Performance Monitoring window displays details about the transmitted signal level measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Local/Remote**, **Radio**, **TSL**.

   The TSL Monitoring window appears.

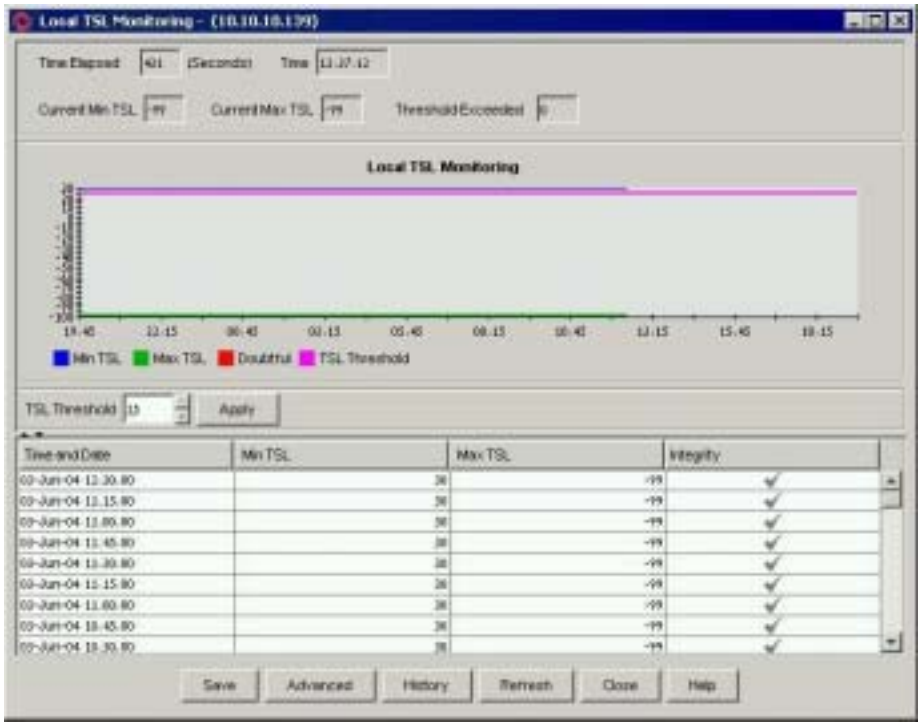


Figure 5-33 TSL Monitoring Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes). The Threshold Exceeded counter at the top of the window displays the number of seconds the threshold value was exceeded during the current interval.

Current Min TSL values are the minimum transmitted level measured during the interval.

Current Max TSL values are the maximum transmitted level measured during the interval.

TSL Threshold is a value that you can set. When a TSL value exceeds the threshold you set, the Threshold Exceeded counter at the top of the PM window will register and display the number of seconds the threshold value was exceeded.

Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

The format of the monitoring table is similar to the RSL table described above.

2. To view daily TSL values over a one-month period, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

SDH

The SDH Performance Monitoring window displays the number of radio UAS (unavailable seconds), measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Local/Remote**, **Radio, SDH**.

   The SDH Monitoring window appears.

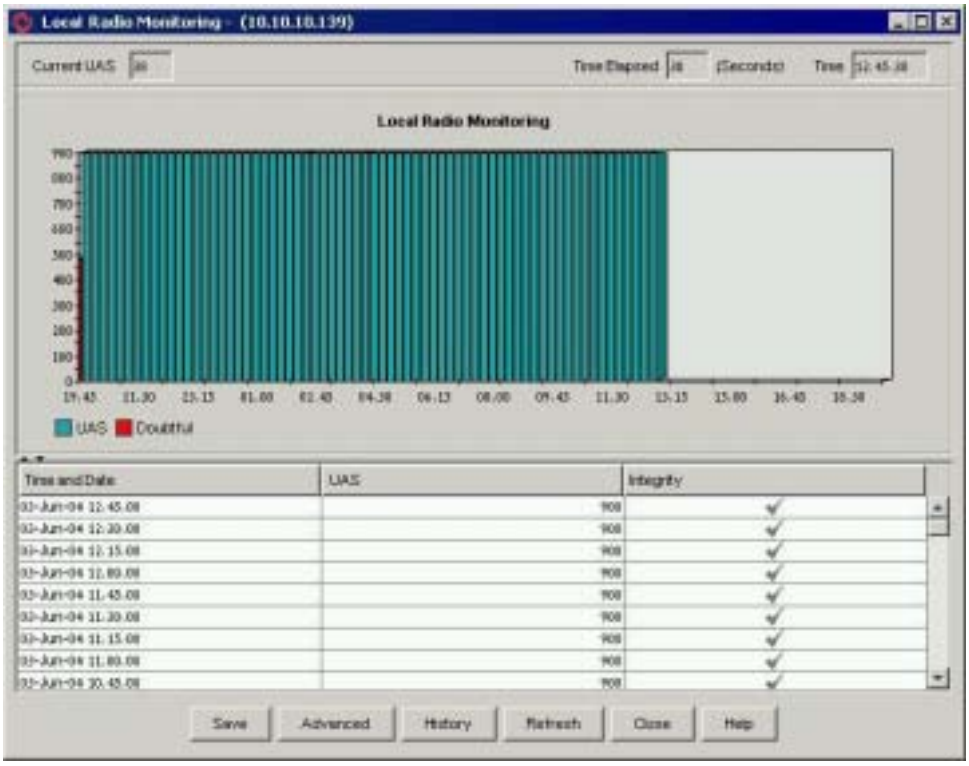


Figure 5-34 SDH Monitoring Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

Current UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

The format of the UAS monitoring table is similar to the RSL table described above.

2. To view historical SDH values, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

Tributaries

Local

The Tributaries Performance Monitoring window displays the UAS (number of Unavailable Seconds per interval) measured every 15 minutes over the last 24 hours, on the E1/T1 interface.

1. Select **Performance**, **Local/Remote**, **Tributaries, E1 #**

   The Tributary Monitoring window appears.

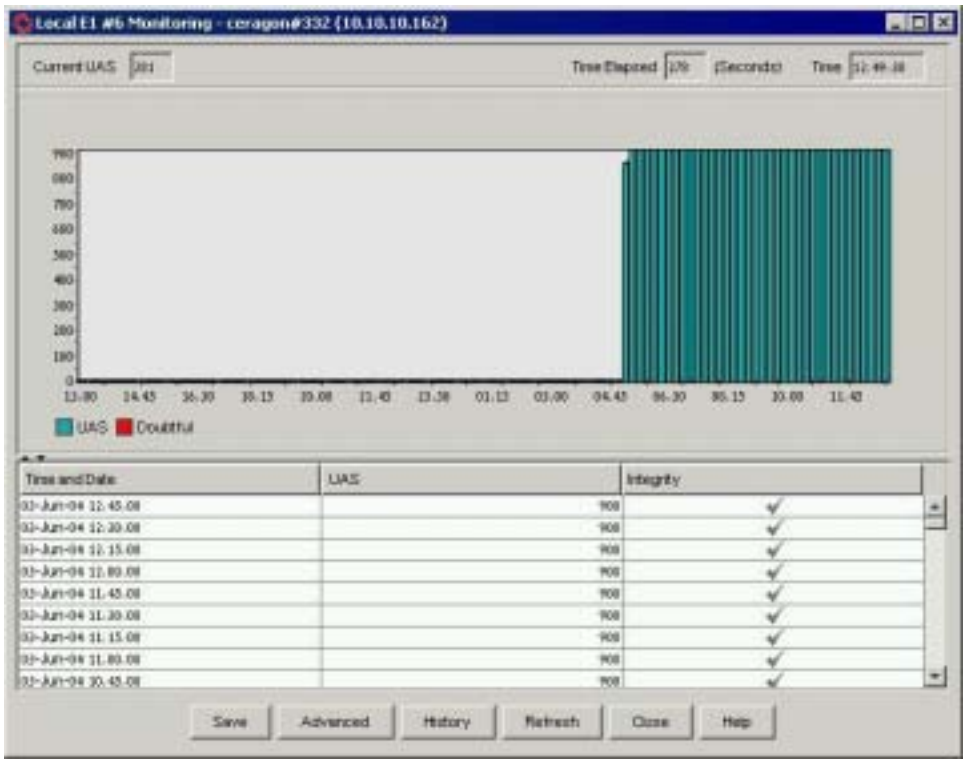


Figure 5-35 Tributary Monitoring Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

The format of the UAS monitoring table is similar to the RSL table described above.

2. To view Historical UAS values, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

Maintenance

Loopback

1. Select **Maintenance**, **Local/Remote**, **Loopback**, or click the Loopback icon.

   The Loopback window appears.

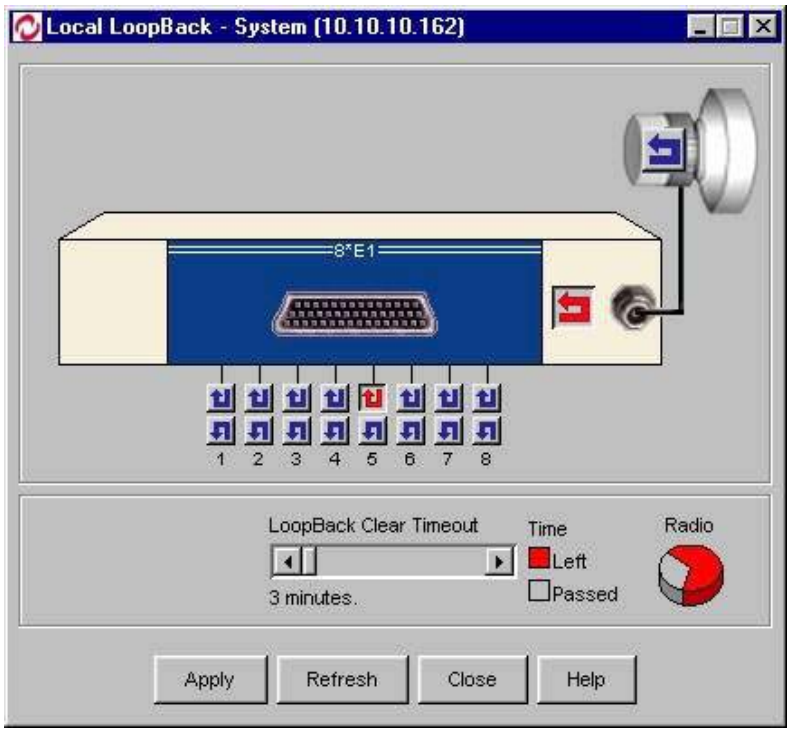


Figure 5-36 Loopback Window

Loopback test types depend on the type of interface in use. In the example shown above, you can click the button on the right side to select an internal IDU loopback test. For each E1 line, you can click the up arrow button to select an internal tributary test, or the down arrow button to select an external tributary test.

Set the **LoopBack Clear Timeout** scale to the amount of time you want the test to run.

When a radio or line loopback test is running, a pie graph displayed to the right of the timeout scale shows how much time is left for the test (as shown in the figure above).

Click **Apply** to run the test.

When you are done with loopback testing, click **Close** to close the window.

Note that closing the window will not stop the loopback test. To stop a test, unmark it by clicking on the relevant arrow button, and then click Apply.

Software Reset

Select **Maintenance**, **Software Reset**, **Local** or **Remote** to reset the IDU agent software for maintenance purposes.

Clear PM

To clear the Performance Monitoring log files, select **Maintenance**, **Clear PM**, **Local** or **Remote**.

Force Far End Tx Level

To force the remote transmission level to the level you set for the local IDU, select **Maintenance**, **Force Far End Tx Level**.

Force Far End Mute Off

To cancel the muting of the remote ODU, select **Maintenance**, **Force Far End Mute Off**.

Protection

1+1 Protection

1. Select **Protection**, **Local/Remote**, **1+1 Protection**, **Protection Configuration** to configure the 1+1 protection switch mechanism.

   The 1+1 Protection window appears.

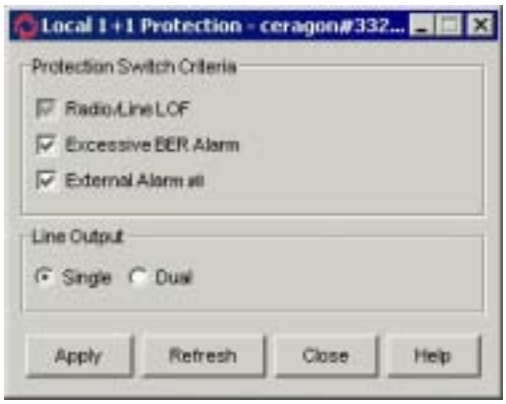


Figure 5-37 Radio Protection Configuration Window

2. In the **Protection Switch Criteria** area, select the criteria for which you want protection switching to occur.
3. For **Line Output**, select either **Single** or **Dual**.
4. Click **Apply** to save the changes.
5. Click **Close** to close the window.

Request Protection Switch

Select **Protection**, **Local/Remote**, **Commands**, **Request Switch** if you want to change between the Primary and Secondary links in a 1+1 system.

Diversity Configuration

1. Select **Protection**, **Local/Remote**, **Diversity**, **Diversity Configuration** to configure Diversity parameters (if the feature was installed).

   The Diversity Configuration window appears.

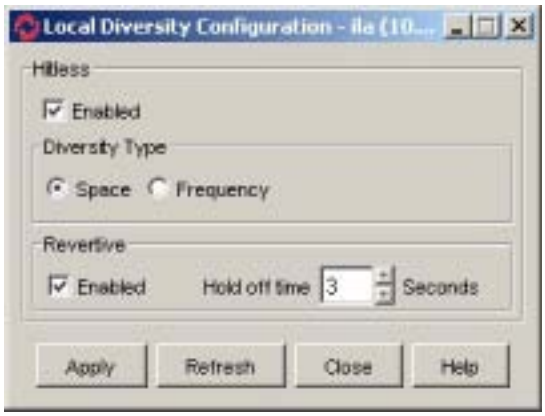


Figure 5-38 Diversity Configuration Window

2. For systems in which the Hitless feature was configured, select **Enabled** to activate the feature.
3. For systems in which the Hitless feature was configured, in the **Diversity Type** area, select either **Space** or **Frequency** diversity.
4. For **Revertive**, select **Enabled** if you want normal traffic on the protection path to be switched back to the original path after it recovers from a fault.

   Revertive mode may be required to support specific services, whereby the shortest physical route offers better performance.

   If you don't select Revertive, no switching to the original fault-cleared path will be performed to prevent unnecessary traffic hits and management event reports.
5. If you selected Enabled, for **Hold off Time** use the arrow buttons to set the delay period between fault detection and path switching. The value can be from 0 to 10 seconds. The default is 0 seconds.
6. Click **Apply** to save the settings.
7. Click **Close** to close the window.

CeraView for FibeAir 1500A/1528A

The following sections describe the CeraView application for FibeAir 1500A/1528A.

For information about system requirements and the CeraView installation procedure, see the section *General* at the beginning of this chapter.

For information about the CeraView Configuration utility, see the section *CeraView Configuration* at the beginning of this chapter.

For information about logging in to CeraView, see the section *Logging in to CeraView* at the beginning of this chapter.

Main Window

After you log in to CeraView, the Main window appears.

The Main window is your starting point for all operations.

Below is a description of the menus, toolbars and other features of the Main window.

Figure 5-1 CeraView for FibeAir 1500A/1528A Main Window

Title Bar

The Title Bar displays the CeraView version and the IP address of the IDU being accessed.

Menu Bar

The Menu Bar contains menus and menu items used to perform CeraView operations.

Toolbar

The Toolbar includes several icons that you can click to perform different operations.

Each icon in the Toolbar is described in the table below.

Icon	Operation
	System Information - used to view and define system information, such as contact personnel and system up time.
	Trap Forwarding Configuration - used to designate managers to which traps will be forwarded.
	Current Alarms - used to view current active alarms.
	Alarm Log - used to view hisorical alarm records.
	External Alarms - used to configure alarms sent to/from external sources.
	ODU Configuration - used to configure the ODU.
	Transport Configuration - used to configure the communication protocol.
	Loopback - used to configure and run loopbacks for testing and troubleshooting.
	Trail Configuration - used to configure the tributaries.
	Online Help - used to view the online help file.

Physical View

A physical view of the FibeAir unit is displayed in the Main window. The view provides a real-time virtual display of the IDU front panel.

Figure 5-2 Physical View in Main Window

The LEDs that appear on the left side in the physical view indicate the actual real-time status of the LEDs on the front panel of the IDU. (LED changes on the actual front panels of the units will be updated in the physical views after a slight delay.)

The LEDcolors are as follows:

Green - indicates proper operation

Yellow - indicates a warning

Red - indicates a major alarm or severe malfunction

The following table lists the LEDs and their indications.

LED	Color			Description
	Red	Yellow	Green	
Power	X		X	**Red** - power supply problem, system not functional
Line	X	X	X	**Red** - no input to main channel / High BER **Yellow** - J0 mismatch
LOF (Loss of Frame)	X		X	**Red** - radio did not recognize information frame (radio link problem/radio LOF)
BER (Bit Error Ratio)	X	X	X	**Red** - radio BER higher than radio excessive error threshold definition (see Sonet/SDH configuration window) **Yellow** - radio BER higher than radio signal degrade threshold definition (see Sonet/SDH configuration window)
LPBK (Loopback)	X		X	**Red** - loopback is active
STBY (Standby)		X	X	**Yellow** - Protected configuration. The unit is currently passive or Tx mute is operating
IDU	X	X	X	**Red** - modem unlocked **Yellow** - high temperature / fan problem
ODU	X	X	X	**Red** - no link / ODU power / ODU unlocked **Yellow** - radio interference / high temperature / Rx/Tx out of range
CBL (Cable)	X		X	**Red** - RF cable open / RF cable short
RMT (Remote Unit)	X	X	X	**Red** - no link / remote unit problem (red LED is lit in the remote unit) **Yellow** - warning in remote unit (yellow LED is lit in the remote unit)
8xE1/T1			X	**Green** - Connected E1/T1 tributary

Menus

The following sections describe the CeraView window menus.

File Menu

System Information

This option allows you to view and define information for the FibeAir system.

1. Select **File**, **System, Information**., or click the System Information icon.

   The System Information window appears.

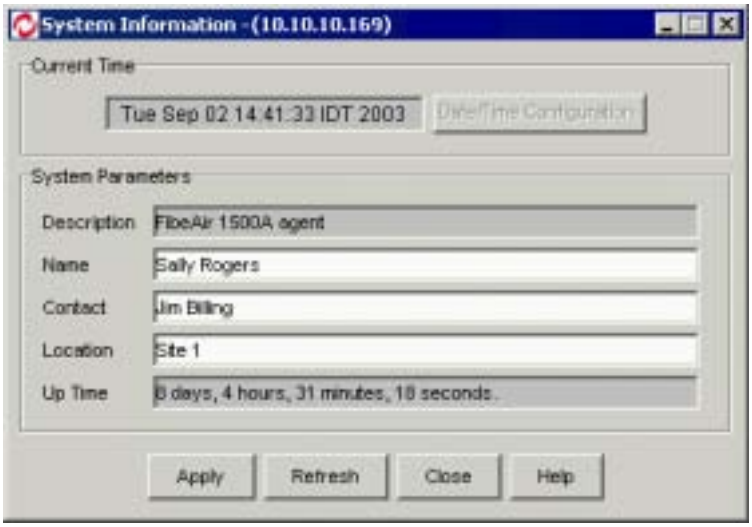


Figure 5-3 System Information Window

2. In the **Current Time** area, click **Date/Time Configuration** and set the date and the time (in the format HH:MM:SS).
3. The read-only **Description** field provides information about the FibeAir system.
4. (Optional) In the **Name** field, enter a name for this link. By convention, this is the node's fully-qualified domain name.
5. (Optional) In the **Contact** field, enter the name of the person to be contacted when a problem with the system occurs. Include information on how to contact the designated person.
6. (Optional) In the **Location** field, enter the actual physical location of the node or agent.
7. The **Up Time** field is read-only and shows how long the system has been operating continuously.
8. Click **Apply** to save the settings.
9. Click **Close**.

Versions

The Versions window displays current software versions and relevant serial numbers. It also displays software versions that will take effect after the unit is reset.

1. Select **File**, **System**, **Versions**.

   The Versions window appears.

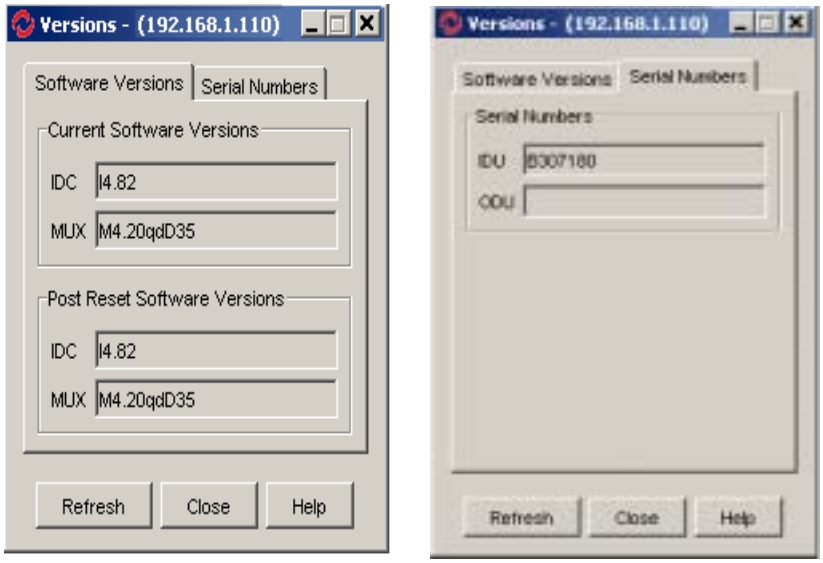


Figure 5-4 Versions Window

2. Click the **Serial Numbers** tab for a list of component serial numbers.

Configuration Report

This option generates a report that includes various parameters and their values, such as system description, software versions, and Tx/Rx frequencies.

1. Select **File, Configuration Report**.

   The Configuration Report window appears.

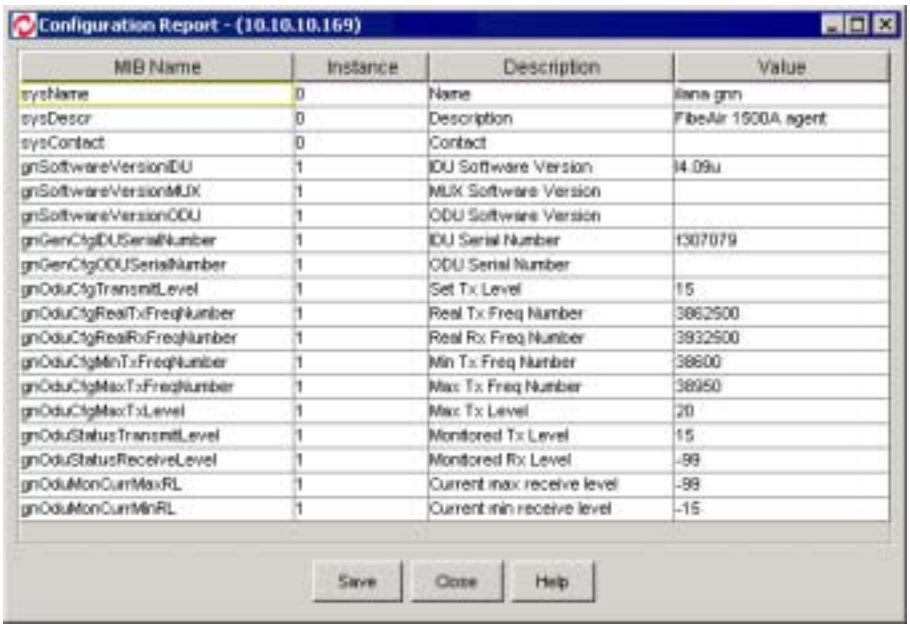


Figure 5-5 Configuration Report Window

2. Click **Save** to save the report in a file for later analysis or downloading.

Configuration File Upload/Download

This option enables you to upload a configuration file from a FibeAir unit to the management module, or download a file from the management module to the FibeAir unit.

1. Select **File**, **Local/Remote**, **Configuration File, Upload from Element/Download to Element**.

   The Upload Configuration File or Download Configuration File window appears.

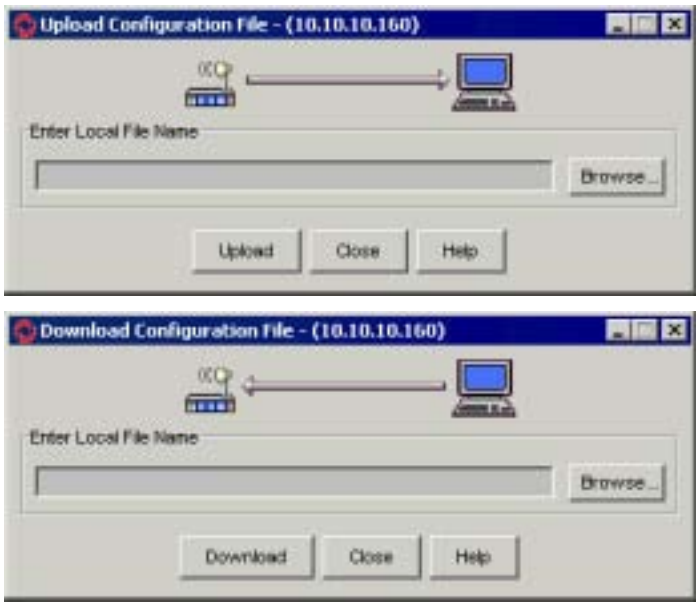


Figure 5-6 Upload/Download Configuration File Windows

2. Click **Browse**, locate the configuration file you want to use, and click **Upload** or **Download**.

After the file is uploaded or downloaded, changes will take place only after the unit is reset.

Software Download

This option enables you to download IDU, ODU, and MUX software updates.

1. Select **File, Software Download**.

   A window appears for you to define the software download procedure.

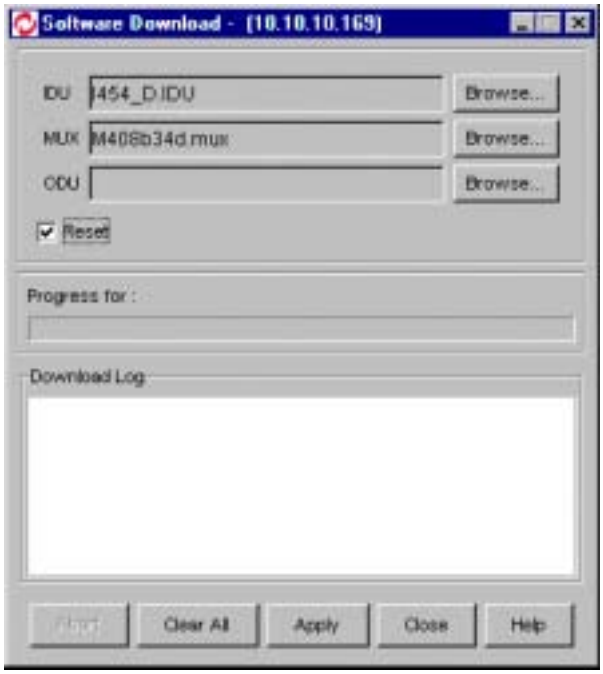


Figure 5-7 Software Download Window

2. Click **Browse** to choose the software file you want to download.

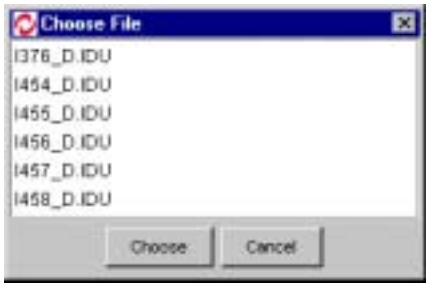


Figure 5-8 Software File Selection Window

3. Select the file you want, and click **Choose**.
4. In the Software Download window, click **Apply**.

   The software file you chose is downloaded and a progress report appears in the Download Log area.

New Session

Select this item to log in for a new CeraView session. The new session will appear in addition to the current session.

When you select this item, the CeraView login window appears for you to specify the IP address of the FibeAir unit you want to access.

Exit

Select this item to exit the CeraView application. You can also exit by clicking on the Close icon (x) in the title bar.

When you exit CeraView, you will be prompted to confirm the exit. Click **OK** to confirm the operation.

Configuration Menu

IDU

External Alarms

The procedure detailed in this section is required only if alarms generated by external equipment are connected to the IDU, or if the IDU alarm outputs are connected to other equipment (using the alarms I/O connector).

1. Select **Configuration**, **IDU**, **External Alarms**, or click the **External Alarms** icon.

   The External Alarms window appears.

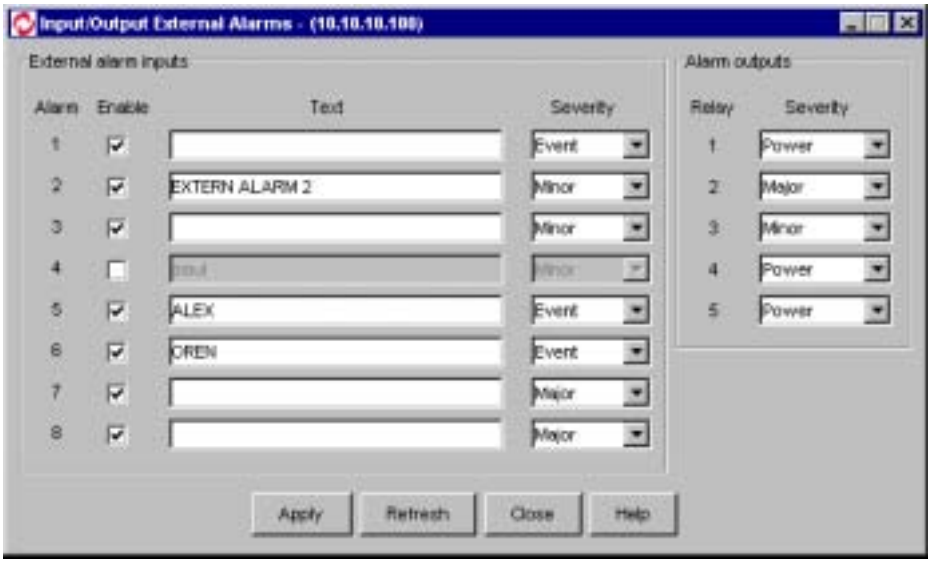


Figure 5-1 Input/Output External Alarms Window

   The microcontroller in the IDU reads alarm inputs (dry contact) and transmits them to the CeraView management system. This allows FibeAir to report external alarms that are not related to its own system.

   For each alarm on the left side of the window, do the following:

2. Click on the box next to the alarm number to enable/disable the alarm.
3. If you enable an alarm, enter a description of the alarm in the text field.

4. Select the alarm's severity level from the drop-down list (Major, Minor, Warning, or Event).
5. FibeAir provides five alarm outputs that can be used by other systems to sense FibeAir alarms. The outputs are configured on the right side of the window.

   The alarm outputs are Form C Relays. Each output relay provides three pins, as follows: Normally Open (NO), Normally Closed (NC), Common (C).

   Output alarms can be defined as Major, Minor, Warning, External, Power, BER, Line, Loopback, LOF, IDU, ODU, Cable, or Remote.

   The default alarm output setting for all relays is "Power".

   The relays may be connected to customer-specific applications. Refer to Appendix B for details concerning the alarm connector pin assignments.
6. Click **Apply** to save the settings.
7. Click **Close**.

Auxiliary Channel

In the Auxiliary Channel window you can select an optional channel for additional data communication.

1. Select **Configuration, IDU, Auxiliary Channel**.

   The Auxiliary Channel Configuration window appears.

Figure 5-2 Auxiliary Channel Configuration Window

2. Select the EOW or User Channel if you will be using those channels.

   EOW - Engineering Order Wire

   User Channel - 64 Kbps
3. Click **Apply** to save the settings.
4. Click **Close**.

Transport

The Transport Configuration window allows you to configure special transmission parameters. This is recommended for advanced users only.

1. Select **Configuration, IDU, Transport**, or click the Transport Configuration icon.

   The Transport Configuration window appears.

Figure 5-3 Transport Configuration Window

2. In the **High Path Trace Identifier (J1)** area, select **J1 Operation** to enable the identifier.

   J1 is used to continuously transmit a Path Access Point Identifier so that a path receiving terminal can verify its ongoing connection to the intended transmitter.

   Received J1 displays the identifier that is receieved for verification.

   For **Transmitted J1**, specify the West and East J1 identifier that will be transmitted to the receiver.

   For **Expected J1**, specify the identifier for West and East that you expect to receive.

   Select **Send AIS on High Path TIM** if you want Alarm Indication Signals to be sent in the event of TIM (Trace Identification Mismatch).

   Select **Send AIS on High Path PLM & UNEQ** if you want Alarm Indication Signals to be sent in the event of PLM (Path Label Mismatch) or UNEQ.

3. For **Protocol**, select the protocol your radio is using.
4. Click **Apply** to save the settings.
5. Click **Close**.

Explanation of TIM Events

SDH provides path trace capability on different levels, as follows:

Regenerator Section Trace - J0
J0 is used to continuously transmit a Section Access Point Identifier so that a section receiver can verify its ongoing connection to the intended transmitter. In the FibeAir radio, the J0 byte is used for **Link ID**.

Path Trace - J1
J1 is used to continuously transmit a Path Access Point Identifier so that a path receiving terminal can verify its ongoing connection to the intended transmitter.

Path Trace - J2
J2 is used to continuously transmit a Low Order Path Access Point Identifier so that a path receiving terminal can verify its ongoing connection to the intended transmitter.

J2 allows the user to verify VC-12 paths, which is useful as a means of checking radio/optical connections whenever changes are made. The path trace ID can be determined by the user for VC-12 trails in each direction (receive/transmit) separately. The user can also display the actual received pattern for maintenance purposes.

The incoming string is checked against the expected receive string. A discrepancy between the strings generates a TIM alarm or an AIS, depending on what you decide for Path TIM activation.

If the trail is protected and you selected the AIS option, a switch to the protection path will be performed in the event of TIM, since AIS is one of the criteria for switching to protection.

Explanation of PLM Events

The SDH path overhead includes signal label information that indicates the composition of the signal. For FibeAir1500A/1528A, the signal labels are automatically set according to the traffic on/off status, as defined in the table below. If the received signal label is not as expected, a PLM alarm is generated.

Signal Label Data

VC Level	Value	Traffic On	Traffic Off
VC-12 (bits 5-7 of V5)	Transmit Value	010 - asynchronous floating	000 - unequipped
	Expected Receive Value	010 - asynchronous floating or 001 - equipped non-specific	000 - unequipped
VC-3 (C2 byte)	Transmit Value	04_H - asynchronous mapping of 34/45 Mbit/s	00_H - unequipped
	Expected Receive Value	04_H - asynchronous mapping of 34/45 Mbit/s or 01_H - equipped non-specific	00_H - unequipped

Trail

The Trail Table maps the VCs (Virtual Containers) representing the E1 lines.

Using this table, you can set several parameters for each line, such as the path name and protected configuration.

1. Select **Configuration, IDU, Trail**, or click the Trail Configuration icon.

   The Trail Configuration window appears.

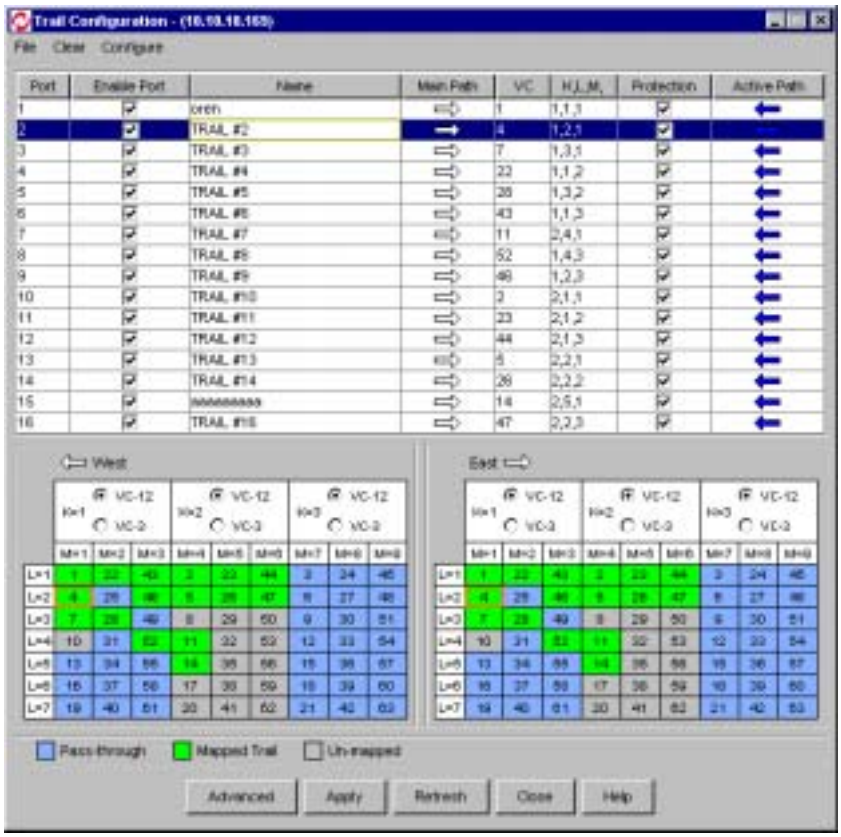


Figure 5-9 Trail Table Window

The table lists up to 16 E1 tributary lines. The VC map section of the table displays 63 VCs (entire STM-1 capacity) and the status of each, represented by different colors. Gray represents an unused VC, Green represents a VC used by an E1 trail, and blue represents a VC designated as *pass-through* (passes the relay frame as is).

Note that VC-3 trails can only be configured as *pass-through*.

2. For each trail, select or deselect the **Enable Port** box. Deselecting the box will block all traffic on that E1/T1 line.
3. In the **Name** column, click in the text box and enter the name you want for that E1/T1 line.
4. In the **Main Path** column, click in the box and select either east or west for the main path.
5. The **VC** and **K,L,M** columns are read-only. The values in those columns represent the Virtual Container mapping for the E1/T1 tributary lines.
6. In the **Protection** column, mark the box if you want the tributary line to run in Protected mode, whereby traffic will be delivered in both directions.
7. The **Active Path** column shows the current active path.
8. In the **West** and **East** sections of the window, select the payload type for each K number.
9. For each VC box, you can right-click the mouse to change the bi-directional connection of the line, as follows:

   Clear No connection (the channel is not in use).

No low order path (LP) alarms and TU alarms (TU-LOP and TU-AIS) will be reported, and no PM (Performance Monitoring) logs will be generated for the channel.

Map Trail — A tributary signal is connected to a specific channel (TU) in the STM-1 signal. For non-protected connections, the tributary is connected to one of the aggregate ports. For protected connections, the tributary is connected to two aggregate ports for path protection.

Note that for protected connections, the same channel number must be used for the two aggregates.

Pass-Through — Matching channels are connected from one aggregate to the other.

10. For advanced trail parameters, select a trail and click **Advanced**.

    The Advanced Parameters window appears.

Figure 5-10 Advanced Trail Table Window

11. In the Advanced Parameters window, click in the **TX J2** field, and enter the transmitted path trace ID string.
12. In the **RX J2 Expected** field, enter the expected path trace ID string.
13. The **RX ID** field is read-only. For protected trails, it displays the actual received pattern from both directions. For non-protected trails it displays the actual received pattern from one direction.
14. For **Hold off Time**, use the arrow buttons to set the delay period between fault detection and path switching. The value can be from 0 to 10 seconds. The default is 0 seconds.
15. For **Oscillation Guard Time**, use the arrow buttons to set the period of time the inactive channel must be free of faults before it can carry traffic again. The value can be from 0 to 60 seconds. The default is 0 seconds.
16. For **Wait to Restore Time**, use the arrow buttons to set the period of time from switching to the protection path, back to the main path. This parameter is only relevant when the *Revertive* mode is active. The value can be from 5 to 12 minutes. The default is 5 minutes.
17. Click **Apply** to save the changes.

18. Click **Close** to close the window and return to the Trail Table window.
19. In the Trail Table window, click **Apply** to save the changes.
20. Click **Close** to close the window.

Synchronization

Synchronization configuration enables you to set values for the network's clock synchronization.

1. Select **Configuration**, **IDU**, **Synchronization**., or click the **Clock** area in the CeraView main window FibeAir physical view.

   The Synchronization Configuration window appears.

Figure 5-11 Synchronization Configuration Window

2. The **Internal Clock Unit** area displays the current clock unit type, state, and status. The type can be ST-3E, ST-3, or Sec.

   The status can be **Unlocked**, which indicates that the clock source is not locked to the primary or secondary path, or **Out of Range**, which indicates that the unit cannot be synchronized with the external clock signal. When this occurs, an Out of Range alarm is generated.

3. To enable/disable the SSM mode, click the **SSM Mode** menu and select enable or disable.

   Note that if the SSM mode is not enabled, each network element will need to determine the clock quality on its own.

4. In the **Primary Clock Parameters** area, for **Source**, click the drop-down list and select the clock source, which can be one of the following:

   - Internal
   - External 1.544 MB
   - Radio
   - Fiber
   - External 2MHz

- External 1 and half MB
- Tributary # (1-16)

5. The **Quality** parameter is used to set the quality level of the clock signal. Click the drop-down list and select the level, which can be one of the following:
   - PRC
   - SSUT
   - SSUL
   - SEC
   - STU
   - DNU
6. Repeat steps 4 and 5 for the **Secondary Clock Parameters** area.
7. Select **Clock Output Mute** if you do not want the internal clock to be used to synchronize other network elements.
8. Click **Apply** to save the settings.
9. Click **Close** to close the window.

ODU

1. Select **Configuration**, **ODU**, or click the ODU Configuration icon.

   The ODU Configuration window appears.

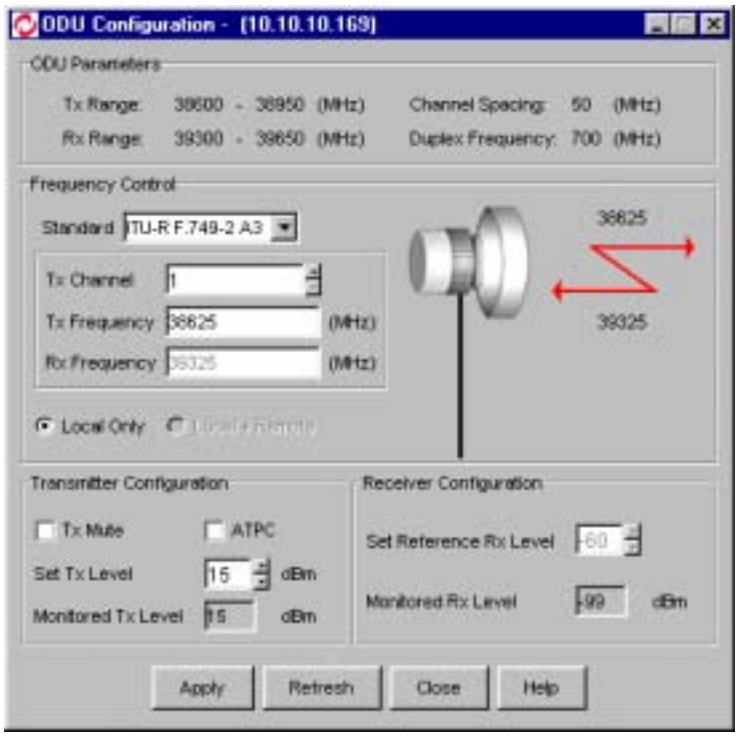


Figure 5-12 ODU Configuration Window

2. The **ODU Parameters** area is read-only.
3. For **Tx Channel**, click the up/down arrows to select the frequency channel you want to use.
4. For **Tx Frequency,** enter the frequency at which the system will transmit.
5. In the **Transmitter Configuration** area, select **Tx Mute** to block transmission to the remote unit. By default, this option is not selected.

   Select **ATPC** to activate the Automatic Transmit Power Control feature.

   For **Set Tx Level**, enter or select the designated signal level. Possible range is -10 to max power level. By default, the transmit signal level is set to the maximum power level.

   The **Monitored Tx Level** field (read-only) displays the system's transmitted power level.
6. In the **Receiver Configuration** area, the **Reference Rx Level** field should be set to the Rx level to which the actual level will be compared.

   The **Monitored Rx Level** field (read-only) displays the received power level.
7. Click **Apply** to save the settings.
8. Click **Close**.

Interfaces

STM1

1. Select **Configuration, Interfaces**, **STM1**, or click the **STM1** area in the physical view of the CeraView main window.

   The STM1 Configuration window appears.

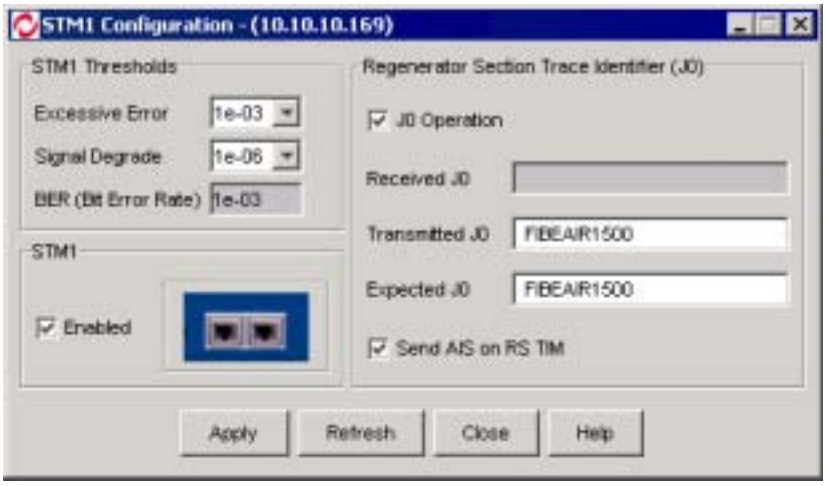


Figure 5-13 STM1 Interface Configuration Window

2. In the **Excessive Error** field, select the level above which an Excessive BER alarm is issued for errors detected over the radio link.
3. In the **Signal Degrade** field, select the level above which a Signal Degrade alarm is issued for errors detected over the radio link.
4. The **BER** field is read-only and shows the above which a BER alarm is issued for errors detected over the radio link.
5. In the **STM1** field, select **Enabled** to activate the interface.
6. In the **Regenerator Section Trace Identifier** area, select **J0 Operation** to use the J0 byte as a trace identifier in the SDH RSOH.

   If you activate J0, use the **Transmitted J0** and **Expected J0** fields to define the IDU identifier string.

   Select **Send AIS on RS TIM**.
7. Click **Apply** to save the settings.
8. Click **Close**.

E1

1. Select **Configuration, Interfaces**, **E1**, or click the **8xE1** area in the CeraView main window FibeAir physical view.

   The E1 Ports Configuration window appears.

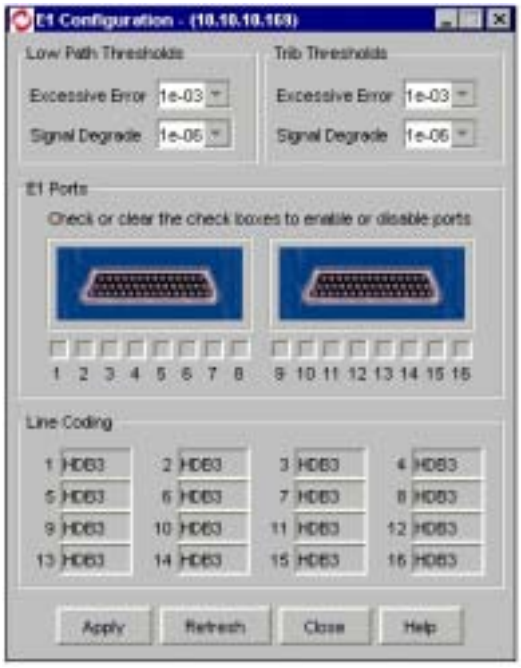


Figure 5-14 E1 Ports Configuration Window

2. In the For **Low Path Thresholds** and **Trib Thresholds** areas, click the drop-down lists and select the values which if exceeded will cause appropriate alarms to be generated.
3. In the **E1 Ports** area, select or deselect the boxes to enable or disable the ports.

   Note: You can enable/disable only ports that were mapped.
4. The **Line Coding** area shows the coding method used for each E1 line.
5. Click **Apply** to save the settings.
6. Click **Close** to close the window.

Radio

1. Select **Configuration, Interfaces**, **Radio**.

   The Radio Configuration window appears.

Figure 5-15 Radio Configuration Window

2. In the **Radio Thresholds** area, for **Excessive Error**, click the drop-down list and select the level above which an Excessive BER alarm is issued for errors detected over the radio link.

   For **Signal Degrade**, select the level above which a Signal Degrade alarm is issued for errors detected over the radio link.

   The **BER** field is read-only and shows the value above which a BER alarm is issued for errors detected over the radio link.

3. In the **Link Parameters** area, select the direction of the FibeAir radio.
4. For **Link ID**, specify the identification number of the link.

   Note: When working with an IDU that has the LINK ID feature on one end and an IDU that does not have this feature on the other end, set the LINK ID to 1.

5. Click **Apply** to save the settings.
6. Click **Close**.

Management System

IP Configuration

1. Select **Configuration**, **Management System**, **IP Configuration**.

   The IP Configuration window appears.

Figure 5-16 IP Configuration Window

2. In the **Ethernet Addresses** area, specify the **Ethernet IP Mask** and **Default Router IP Address**.
3. In the **Serial NMS** area, specify the **IP Mask**, **Baud Rate**, and **Modem Phone Number**.
4. Click **Apply** to save the changes.
5. Click **Close**.

Trap Forwarding

1. Select **Configuration**, **Management System**, **Trap Forwarding**, or click the Trap Forwarding icon.

   The Trap Forwarding Configuration window appears.

Figure 5-17 Trap Forwarding Configuration Window

2. In the **Managers IP Address** area, specify the IP addresses of the managers to which you want traps to be sent. For each manager IP you specify, specify the **Trap Port**, and for **Send Trap for Alarms with Severity**, select the severity filter to determine which types of alarms will be forwarded.
3. In the **Send Trap for Alarms of Group** section, you determine which alarms will be sent as SNMP traps to each manager. In each manager column, select the alarm types you want to include for that manager.
4. In the **Trap Options** area, select **Standard traps include serial number** if you want trap messages to include the IDU serial number.

   Select **Report local traps of far end IDU** if you want remote IDU trap messages to be reported locally.

   Select **Use different ID for each alarm type** if you want each type of alarm to receive a unique ID.

   Select **Send "clear" traps with zero severity** if you want to receive information concerning "clear" traps.
5. For **CLLI** (Common Language Location Identifier), enter up to 18 characters that will represent your system ID when traps are sent.
6. For **Heartbeat Period**, a heartbeat signal will be generated every x minutes (the number you enter) to tell your system that the trap meachnism is working.
7. Click **Apply** to save the settings.
8. Click **Close**.

NTP Configuration

NTP (Network Time Protocol) configuration is performed when an NTP server is used to synchronize network activity.

1. Select **Configuration**, **Management System**, **NTP**.

   The NTP Configuration window appears.

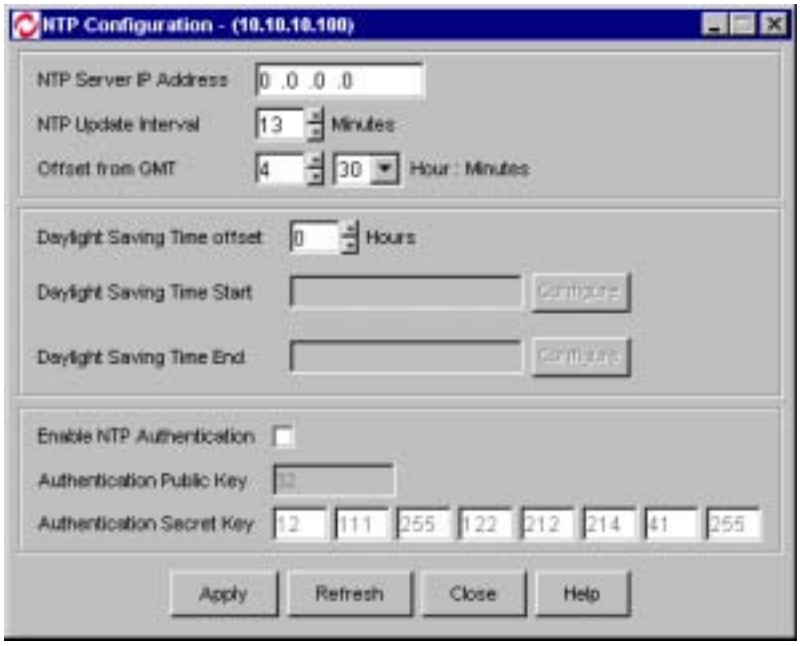


Figure 5-18 NTP Configuration Window

2. Enter the IP of the NTP server.
3. For **NTP Update Interval**, use the up/down arrows to select the amount of time (minutes) between synchronization updates.
4. For **Offset from GMT**, use the arrow buttons and the drop-down list to select the amount of time required to compensate for offset from the GMT (Greenwich Mean Time).
5. For **Daylight Saving Time Offset**, click the arrow buttons to set the amount of time required to compensate for daylight saving.
6. For **Daylight Saving Time Start**, click **Configure** to set the beginning of the daylight saving time period.
7. For **Daylight Saving Time End**, click **Configure** to set the end of the daylight saving time period.
8. Select **Enable NTP Authentication** for secure access to the NTP server.

   If you enable NTP, enter the **Authentication Public Key**, and the **Authentication Secret Key** numbers.
9. Click **Apply** to save the settings.
10. Click **Close**.

In-band Configuration

In-band configuration is performed when you want to work with In-band Management. In-band Management refers to a method whereby the network management software sends management packets through the same network it is managing. This differs from out-of-band management in which the network management software uses a different network (overlay network) in order to communicate with the managed elements.

1. Select **Configuration**, **Management System**, **In-band**.

   The In-band Configuration window appears.

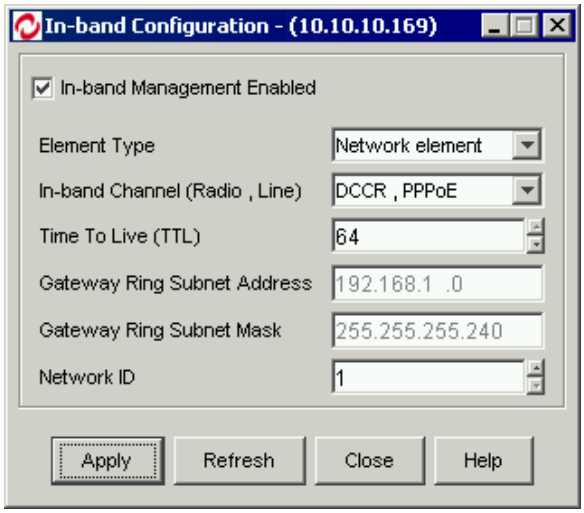


Figure 5-19 In-band Configuration Window

2. Select **In-band Management Enabled** to activate In-band management.
3. For **Element Type**, click the drop-down list and select the desired element (Network Element or Gateway).
4. For **In-band Channel**, click the drop-down list and select the channel you want to use.
5. For **Time To Live (TTL)**, use the up/down arrows to select the desired value.
6. The **Gateway Ring Subnet Address** and **Gateway Ring Subnet Mask** fields are read-only.
7. For **Network ID**, use the arrow buttons to select the desired value.
8. Click **Apply** to save the settings.
9. Click **Close** to close the window.

Alarms Menu

Current Alarms

1. Select **Alarms**, **Current Alarms**, or click the Current Alarms icon.

   The Current Alarms window appears.

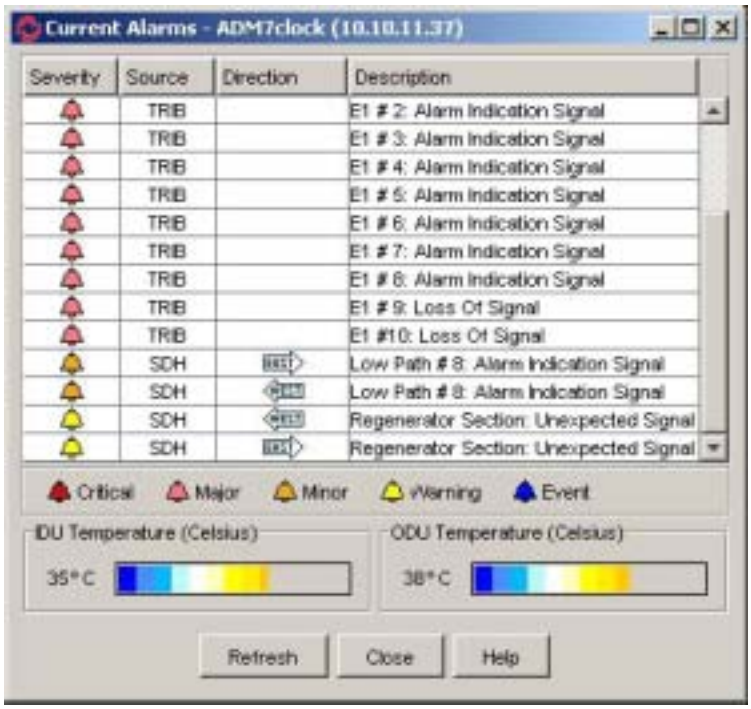


Figure 5-20 Current Alarms Window

Each line in the window describes a different alarm.

The color in the **Severity** column indicates the severity of the alarm, as shown at the bottom of the alarm list.

The source of the alarm appears in the **Source** column.

The **Direction** column indicates the transmission direction of the unit that generated the alarm.

The **Description** column provides information about the alarm.

In addition to the current alarms, the current IDU and ODU temperatures are shown at the bottom of the window.

Alarm Log

1. Select **Alarms**, **Alarm Log**, or click the Alarm Log icon.

   The Alarm Log window appears.

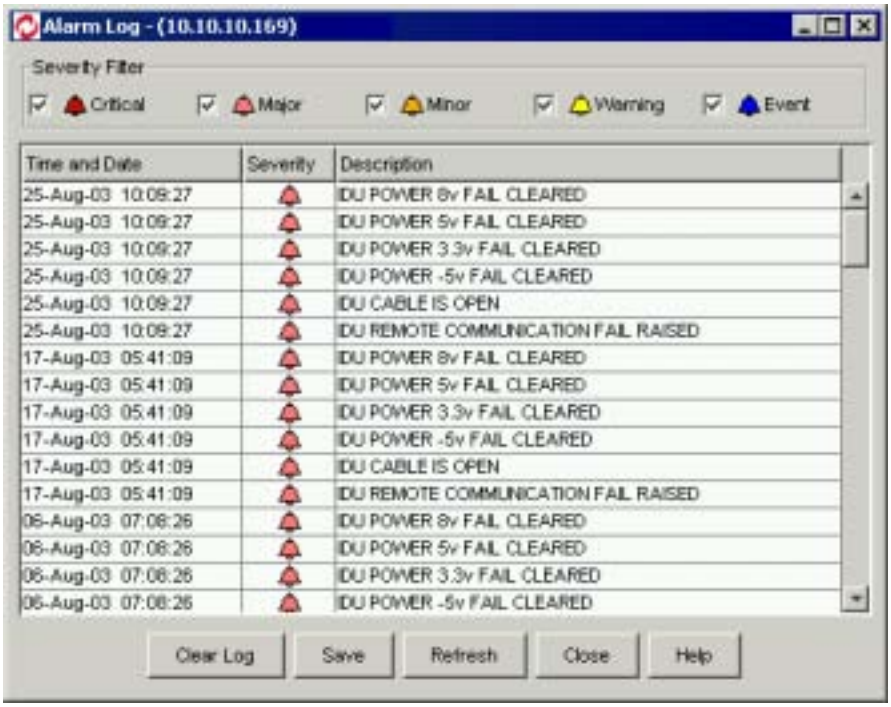

Alarm Log - (10.10.10.169)
Severity Filter
Critical
Major
Minor
Warning
Event
Time and Date
Severity
Description
25-Aug-03 10:09:27 IDU POWER 8v FAIL CLEARED
25-Aug-03 10:09:27 IDU POWER 5v FAIL CLEARED
25-Aug-03 10:09:27 IDU POWER 3.3v FAIL CLEARED
25-Aug-03 10:09:27 IDU POWER -5v FAIL CLEARED
25-Aug-03 10:09:27 IDU CABLE IS OPEN
25-Aug-03 10:09:27 IDU REMOTE COMMUNICATION FAIL RAISED
17-Aug-03 05:41:09 IDU POWER 8v FAIL CLEARED
17-Aug-03 05:41:09 IDU POWER 5v FAIL CLEARED
17-Aug-03 05:41:09 IDU POWER 3.3v FAIL CLEARED
17-Aug-03 05:41:09 IDU POWER -5v FAIL CLEARED
17-Aug-03 05:41:09 IDU CABLE IS OPEN
17-Aug-03 05:41:09 IDU REMOTE COMMUNICATION FAIL RAISED
06-Aug-03 07:08:26 IDU POWER 8v FAIL CLEARED
06-Aug-03 07:08:26 IDU POWER 5v FAIL CLEARED
06-Aug-03 07:08:26 IDU POWER 3.3v FAIL CLEARED
06-Aug-03 07:08:26 IDU POWER -5v FAIL CLEARED
Clear Log
Save
Refresh
Close
Help

Figure 5-21 Alarm Log Window

The Alarm Log window displays the following information:

Time - The time the alarm was triggered.

Date - The date the alarm was triggered.

Severity - The severity of the alarm. You can determine which severity levels will be displayed in the window by selecting the levels at the top of the window.

Description - A description of the alarm, and its status (RAISED, CLEARED).

To clear the log file, click **Clear Log**.

To save the log report in the window, click **Save**.

To close the window, click **Close**.

Save Alarms to File

To save current alarms to a file, select **Alarms**, **Start Saving Log**.

In the Choose Alarm Log File window that appears, select the file you want to save the alarms to and click **Save**.

Performance Menu

Radio

RSL

The RSL Performance Monitoring window displays received signal level values measured over the past 24 hours.

1. Select **Performance**, **Radio**, **RSL**.

   The RSL Monitoring window appears.

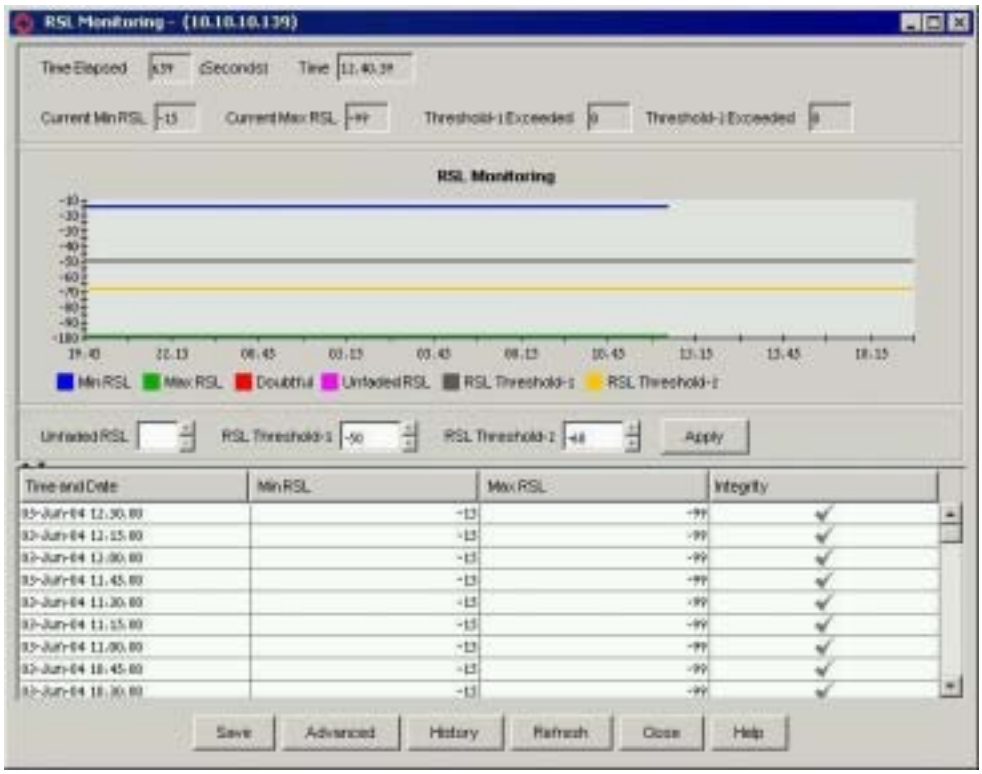


Figure 5-22 RSL Monitoring Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes). The Threshold Exceeded counters at the top of the window display the number of seconds threshold values were exceeded during the current interval.

Current Min RSL values are the minimum received level measured during the interval.

Current Max RSL values are the maximum received level measured during the interval.

Unfaded RSL is the theoretical expected RSL value (not the actual value), which can be calculated by the user (as a function of distance, frequency, etc.). The value is used only for reference purposes.

RSL Threshold 1 and RSL Threshold 2 are values that you can set. When an RSL value exceeds the thresholds you set, the Threshold Exceeded counters at the top of the PM window will display the number of seconds the threshold values were exceeded.

Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

The monitoring table displays RSL values over the last 24 hours. The values are the same as those that appear in the graph, only in table format.

The Min RSL column shows the minimum received level measured during the interval.

The Max RSL column shows the maximum received level measured during the interval.

The Integrity column indicates whether or not the values received at that time and date are reliable. A red x icon in the column indicates that the values are not reliable due to a possible power surge or power failure event that occurred at that time. (This column corresponds to the Doubtful indication in the graphic window.)

Click Advanced for the additional Threshold 1 Exceeded and Threshold 2 Exceeded columns, which list the number of times RSL thresholds specified in the main RSL Monitoring window were exceeded.

2. To view daily RSL values over a one-month period, click **History**.

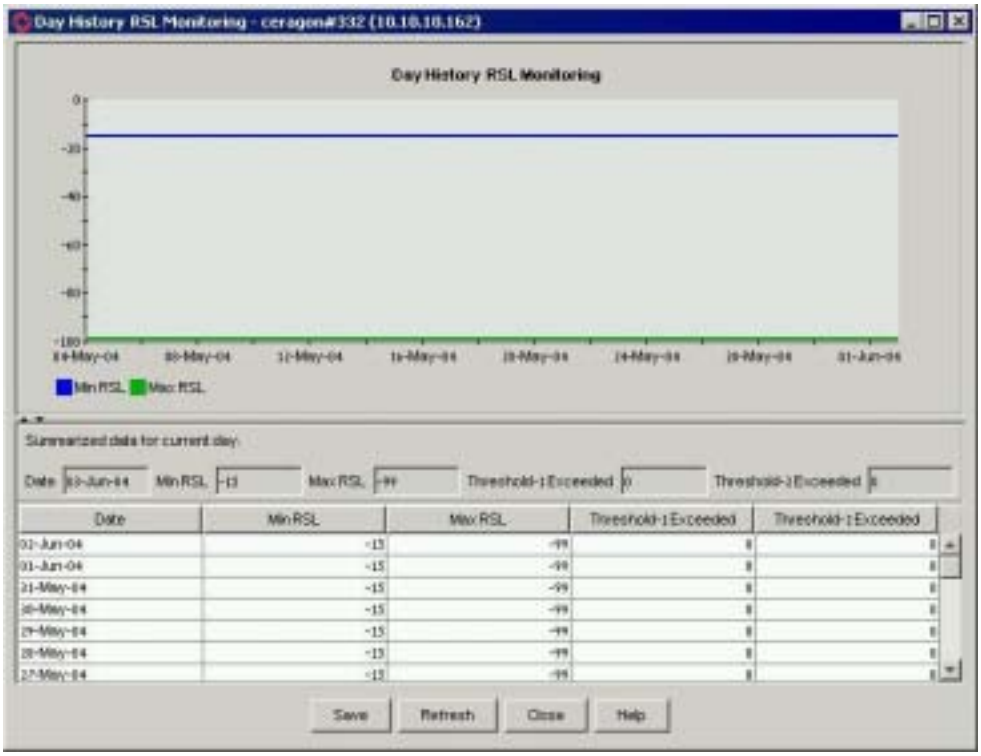


Figure 5-23 RSL History Window

The values shown in the window are values that were received over the last 30 days.

Note: Since the current day's data is not complete until the end of the day, its partial data is presented above the main table area.

Click **Save** to save current values in the table to a file.

TSL

The TSL Performance Monitoring window displays details about the transmitted signal level measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Radio**, **TSL**.

   The TSL Monitoring window appears.

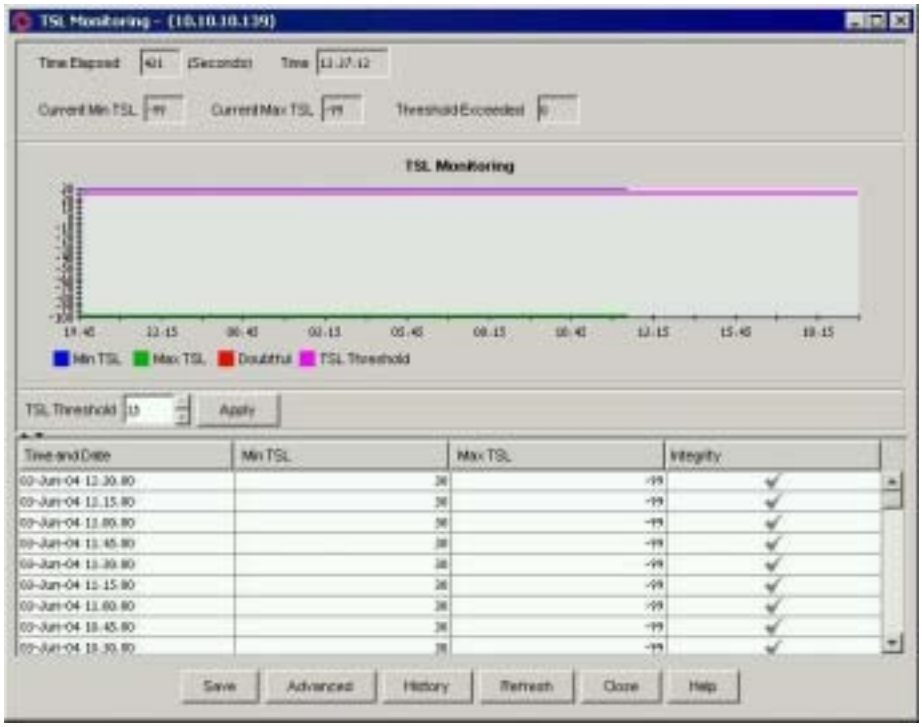


Figure 5-24 TSL Monitoring Window

   Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes). The Threshold Exceeded counter at the top of the window displays the number of seconds the threshold value was exceeded during the current interval.

   Current Min TSL values are the minimum transmitted level measured during the interval.

   Current Max TSL values are the maximum transmitted level measured during the interval.

   TSL Threshold is a value that you can set. When a TSL value exceeds the threshold you set, the Threshold Exceeded counter at the top of the PM window will register and display the number of seconds the threshold value was exceeded.

   Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

   The format of the monitoring table is similar to the RSL table described above.

2. To view daily TSL values over a one-month period, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

SDH

The SDH Performance Monitoring window displays the number of radio UAS (unavailable seconds), measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Radio, SDH**.

   The SDH Monitoring window appears.

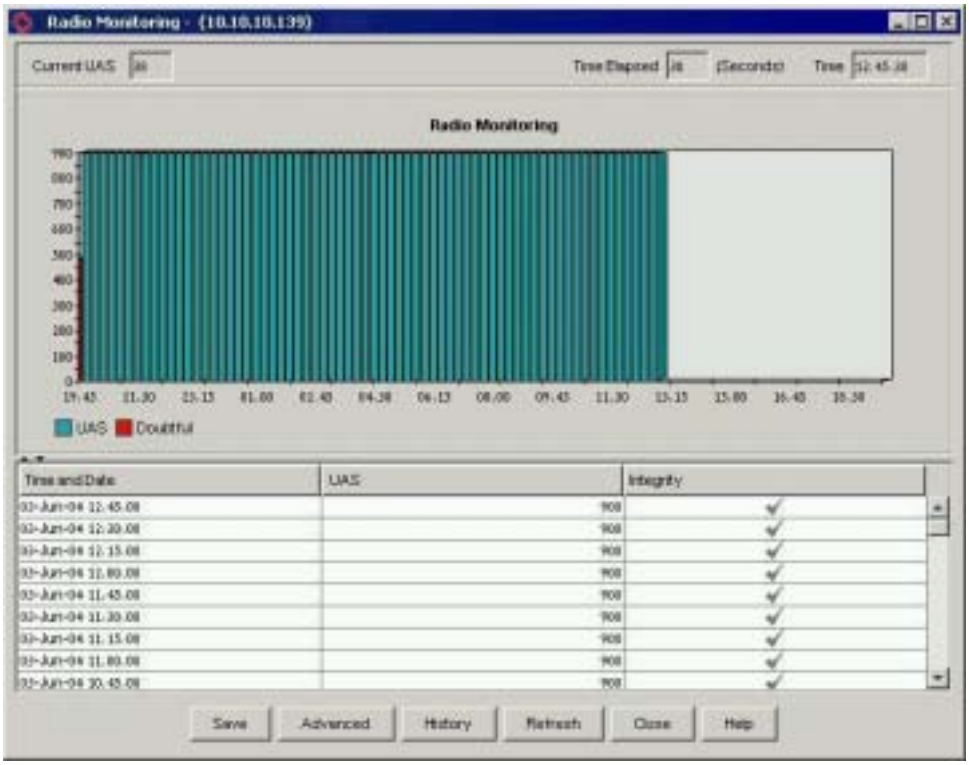


Figure 5-25 SDH Monitoring Window

   Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

   Current UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

   The format of the UAS monitoring table is similar to the RSL table described above.

2. To view historical SDH values, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

Tributaries

The Tributaries Performance Monitoring window displays the UAS (number of Unavailable Seconds per interval) measured every 15 minutes over the last 24 hours, on the E1/T1 interface.

1. Select **Performance**, **Tributaries, E1 #**.

   The Tributary Monitoring graphic window appears.

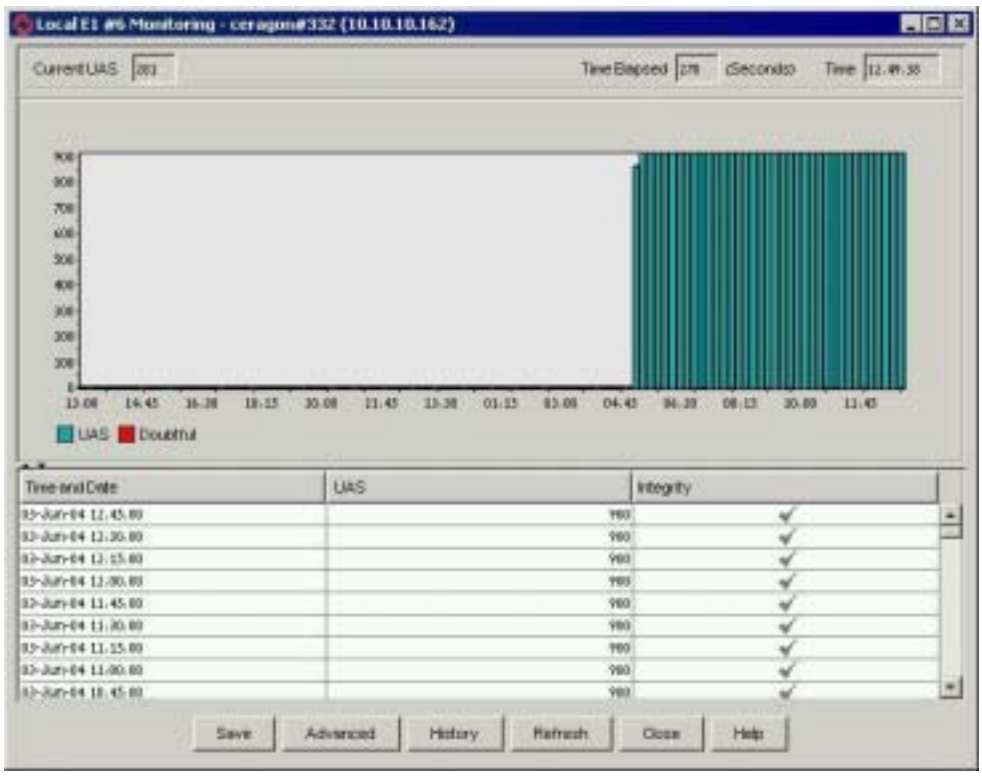


Figure 5-26 Tributary Monitoring Graphic Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

The format of the UAS monitoring table is similar to the RSL table described above.

2. To view historical UAS values, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

Trail

The Trail Performance Monitoring window displays trail signal levels measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Trail**, ***Trail Number, East/West***.

   The Trail Monitoring graphic window appears.

Figure 5-27 Trail Monitoring Graphic Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

The format of the UAS monitoring table is similar to the RSL table described above.

2. To view historical UAS values, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

Maintenance

Loopback

1. Select **Maintenance**, **Loopback,** or click the Loopback icon.

   The Loopback window appears.

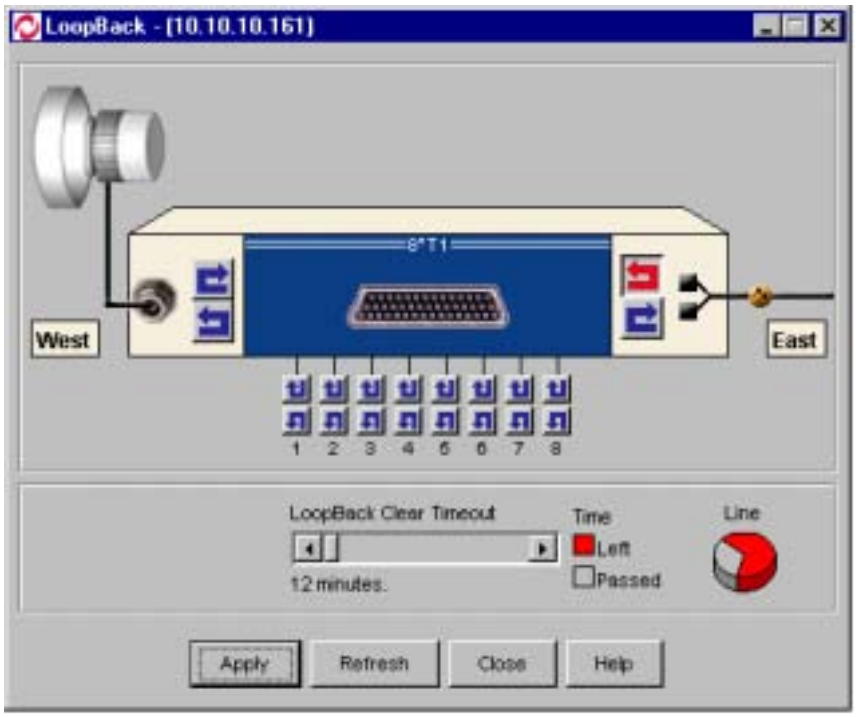


Figure 5-28 Loopback Window

2. Click the upper button on the west side to select an external radio loopback test.

   Click the lower button on the west side to select an internal radio loopback test.

   Click the upper button on the east side to select an external line loopback test.

   Click the lower button on the east side to select an internal line loopback test.

   Click the upper button in the trail list to select an external trail loopback test.

   Click the lower button in the trail list to select an internal trail loopback test.

3. Set the **LoopBack Clear Timeout** scale to the amount of time you want the test to run.

   When a radio or line loopback test is running, a pie display to the right of the timeout scale shows how much time is left for the test (see the figure above).

   The Timeout scale is used only for radio and line loopbacks.

4. Click **Apply** to run the test.
5. When you are done with loopback testing, click **Close** to close the window.

   Note that closing the window will not stop the loopback test. To stop a test, unmark it by clicking on the relevant arrow button, and then click Apply.

Software Reset

Select **Maintenance**, **Software Reset** to reset the IDU agent software for maintenance purposes.

Clear PM

Select this item to clear the Performance Monitoring log files.

Force Far End Tx Level

Select this item to force the remote Tx level to the value set for the local IDU.

Force Far End Mute Off

Select this item to mute remote ODU transmission. This setting will override the setting in the Local ODU Configuration window.

Protection

Radio Protection

1. Select **Protection**, **Radio**, **Protection Configuration** to configure the radio protection switch mechanism.

   The Radio Protection configuration window appears.

Figure 5-29 Radio Protection Configuration Window

2. In the **Protection Switch Criteria** area, select the criteria for which you want protection switching to occur.
3. For **Line Output**, select either **Single** or **Dual**.
4. Click **Apply** to save the changes.
5. Click **Close** to close the window.

Force Radio Protection Switch

Select **Protection**, **Radio**, **Force Switch** if you want to change between the Primary and Secondary links in a 1+1 system.

Trail Protection

1. Select **Protection**, **Trail** to activate the protected path mechanism for the desired ports.

   The Trail Protection window appears.

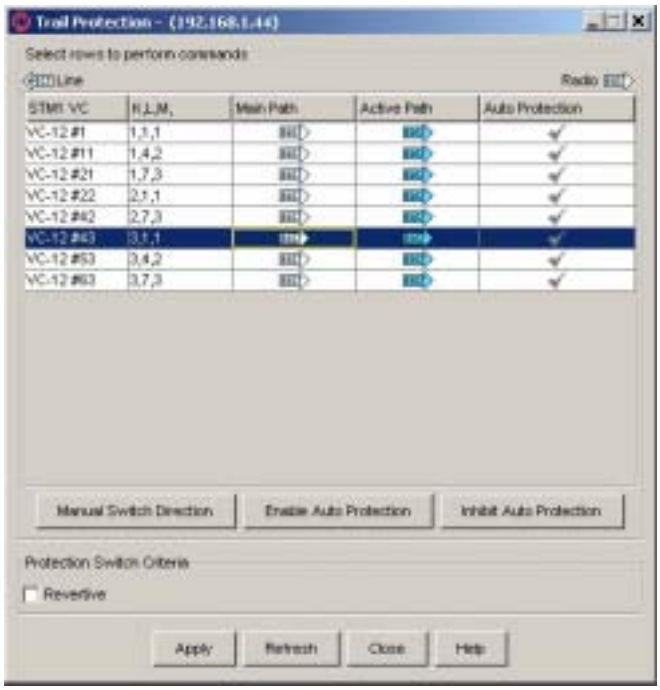


Figure 5-30 Trail Protection Window for STM-1

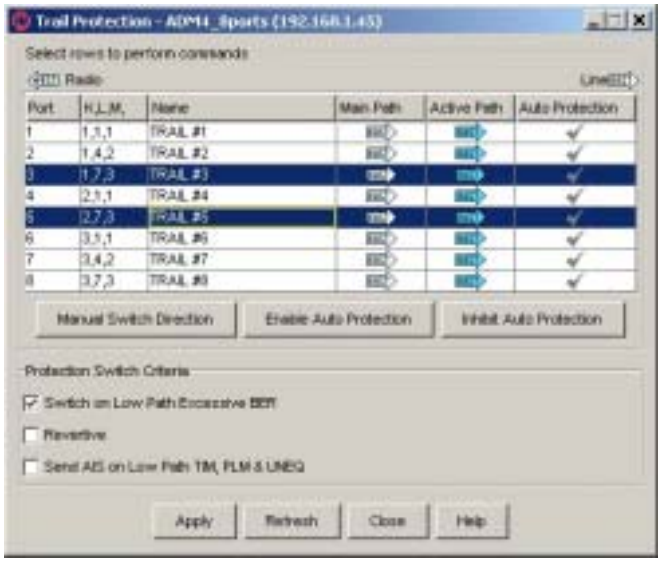


Figure 5-31 Trail Protection Window for E1 Tributaries

2. In the **Protection Switch Criteria** area, select **Switch on Low Path Excessive BER** (E1 tributaries window only) if you want the data to be delivered in the opposite direction when the BER threshold level is exceeded.

   Select **Revertive** if you want normal traffic on the protection path to be switched back to the original path after it is recovered from a fault.

   Revertive mode may be required to support specific services, whereby the shortest physical route offers better performance. For example, for synchronization of another network using protected E1. The main path will generally be shorter, and the protection path will be longer.

   If you don't select Revertive, no switching to the original fault-cleared path will be performed to prevent unnecessary traffic hits and management event reports.

Select **Send AIS on Low Path TIM, PLM &UNEQ** (E1 tributaries window only) if you want Alarm Indication Signals to be sent in the event of TIM, PLM, and UNEQ (see explanation of these events provided in the section **Configuration Menu**, **IDU**, **Transport** earlier in this chapter).

3. In the **Trail List** area, select a row, and click **Manual Switch Direction** if you want to switch the traffic direction of the active path. This is a one-time operation that will be cleared after the current trail configuration session ends.

   Select **Enable Auto Protection** if you want the system to automatically switch the traffic direction upon detection of a fault in the current active path.

   To deactivate Auto Protection, select the relevant row, and click **Inhibit Auto Protection**.

   Note: To select more than one row in the trail list, hold down the **Ctrl** key on the keyboard.

4. Click **Apply** to save the settings.
5. Click **Close**.

CeraView for FibeAir 1500P

The following sections describe the CeraView application for FibeAir 1500P.

For information about system requirements and the CeraView installation procedure, see the section *General* at the beginning of this chapter.

For information about the CeraView Configuration utility, see the section *CeraView Configuration* at the beginning of this chapter.

For information about logging in to CeraView, see the section *Logging in to CeraView* at the beginning of this chapter.

Main Window

After you log in to CeraView, the Main window appears.

The Main window is your starting point for all operations.

Below is a description of the menus, toolbars and other features of the Main window.

Figure 5-1 CeraView for FibeAir 1500P Main Window

Title Bar

The Title Bar displays the CeraView version, the agent's system name, and the agent's IP address.

Menu Bar

The Menu Bar contains menus and menu items used to perform CeraView operations.

Protection Icons

The protection icons indicate the status of the protection system, as follows:

Indicates that the system is in the *Lockout* or *Forced Switch* mode.

The lock icon appears as a result of either a **Force Switch** or **Lockout** option selection from the Protection menu.

If you select Lockout, protection switching will not occur even if switch criteria is met, until you select **Clear Lockout**.

If you select Force Switch, a switch will occur between the active and standby shelfs, and there will be no further switching until you select **Clear Force**.

In addition, note the following:

- If you select Lockout, you cannot perform a Force Switch or Request Switch.
- If you select Force Switch, you cannot perform a Request Switch.
- Commands that you cannot perform will be disabled in the menu.

Indicates that the system is in the *Internal Protection* mode, with the green arrow indicating the active shelf.

Toolbar

The Toolbar includes several icons that you can click to perform different operations.

Each icon in the Toolbar is described in the table below.

Icon	Operation
	System Information - used to view and define system information, such as contact personnel and system up time.
	Trap Forwarding Configuration - used for trap configuration, such as designating managers to which traps will be forwarded.
	Current Alarms - used to view current active alarms.
	Alarm Log - used to view historical alarm records.
	Input/Output External Alarms - used to configure alarms sent to/from external sources.
	ODU Configuration - used to configure the left and right ODUs.
	When XPIC is enabled, an “x” will appear in the icon.
	Loopback - used to configure and run left and right unit loopbacks for testing and troubleshooting.
	Refresh - used to update the front panel view in the main window.
	Online Help - used to view the online help file.

Physical View

A physical view of the FibeAir unit is displayed in the Main window. The view provides a virtual display of the IDU front panel.

Figure 5-2 Physical View in Main Window

The LEDs that appear on the left side in the physical view indicate the actual status of the LEDs on the front panel of the IDU.

The LEDcolors are as follows:

Green - indicates proper operation

Yellow - indicates a warning

Red - indicates a major alarm or severe malfunction

Notes:

- When changes occur in the LEDs of the actual units, LEDs in the physical view in CeraView will be updated after a slight delay.
- When a *hot swap* occurs (a front panel shelf is replaced while the FibeAir unit is operating) the physical view in CeraView will be updated and continue its display.
- The physical view in CeraView includes several areas that you can click to open relevant configuration windows. The areas include Serial, Management, Alarms In/Out, Radio, Protection, East/West, and the Interface.

The following table lists the front panel LEDs and their functions.

Drawer	LED Name	Indications	Severity
IDC	E1/T1 hardware-activated	Green - valid E1/T1 signal (when E1/T1 Wayside channel is supported in hardware)	-----
		Red - LOS in E1/T1 line	Major
		Gray - E1/T1 is not supported, or Wayside channel is disabled	-----
	ETH hardware-activated	Green or blinking green - active Ethernet signal	-----
		Gray - no link or no cable	-----
	IDC	Green - IDC OK	
		Yellow - configuration/firmware mismatch, or fan failure	Warning
		Red - hardware failure in IDC module	Major
	RMT	Red - major alarm in one or both of the remote drawers Red - local remote communication error	Major
		Green - OK	-----
		Yellow - minor alarm in one or both of the remote drawers. (If there are both minor and major alarms in the remote, the LED will be red -m indicating the worst alarm) Yellow - fan failure in the remote	Minor
	Prot	Green - protection cable OK	-----
		Red - protection cable failure	Minor
		Gray - protection disabled	-----
Drawer	Drawer	Green - drawer OK	-----
		Yellow - drawer in standby mode	-----
		Red - drawer hardware failure	Major
	ODU	Green - ODU OK	-----
		Red - ODU failure	Major
	CBL	Red - cable open	Major
		Red - cable short	Major
		Red - cable swap	Major
		Green - OK	-----
	LPBK	Green - OK	-----
		Red - loopback in progress	Major

Drawer	LED Name	Indications	Severity
	Radio	Green - OK	-----
		Red - LOF/EXC	Major
		Yellow - SD	Minor
	Line	Red - LOS/LOF/EXC	Major
		Yellow - SD/unexpected	Minor
		Green - OK	-----
		Gray - disabled	-----

Menus

The following sections describe the CeraView window menus.

File Menu

System Information

This option allows you to view and define information for the FibeAir system.

1. Select **File**, **System, Information**., or click the System Information icon.

   The System Information window appears.

Figure 5-3 System Information Window

2. In the **Current Time** area, click **Date/Time Configuration** and set the date and the time (in the format HH:MM:SS).
3. The read-only **Description** field provides information about the FibeAir system.
4. (Optional) In the **Name** field, enter a name for this link. By convention, this is the node's fully-qualified domain name.
5. (Optional) In the **Contact** field, enter the name of the person to be contacted when a problem with the system occurs. Include information on how to contact the designated person.
6. (Optional) In the **Location** field, enter the actual physical location of the node or agent.
7. The **Up Time** field is read-only and shows how long the system has been operating continuously.
8. Click **Apply** to save the settings.
9. Click **Close**.

Versions

The Versions window displays current software versions and relevant serial numbers. It also displays software versions that will take effect after the unit is reset.

1. Select **File**, **System**, **Versions**.

   The Versions window appears.

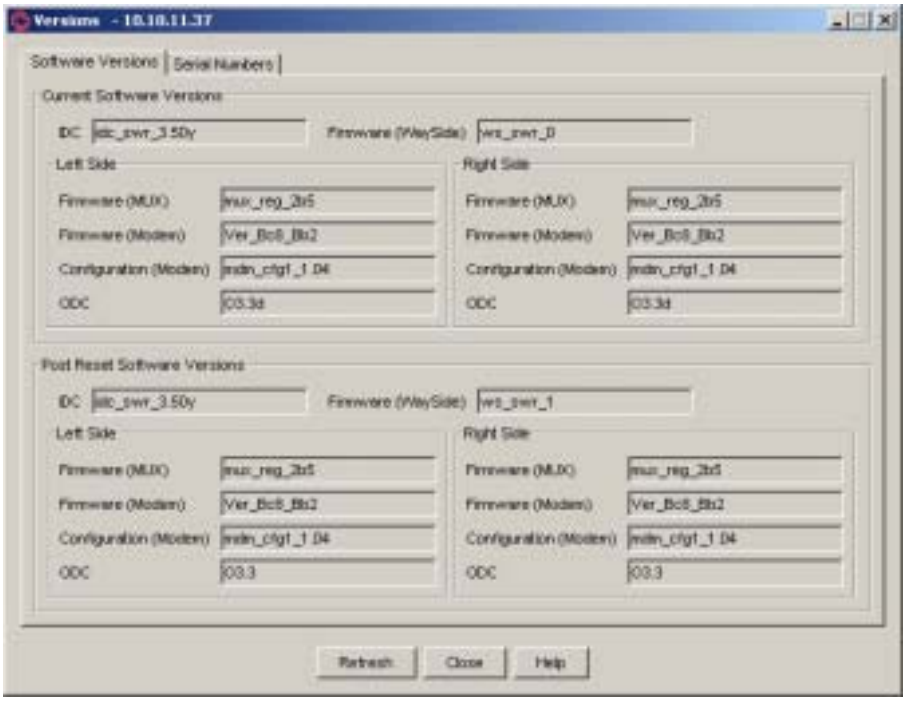


Figure 5-4 Versions Window

2. Click the **Serial Numbers** tab for a list of current component serial numbers.

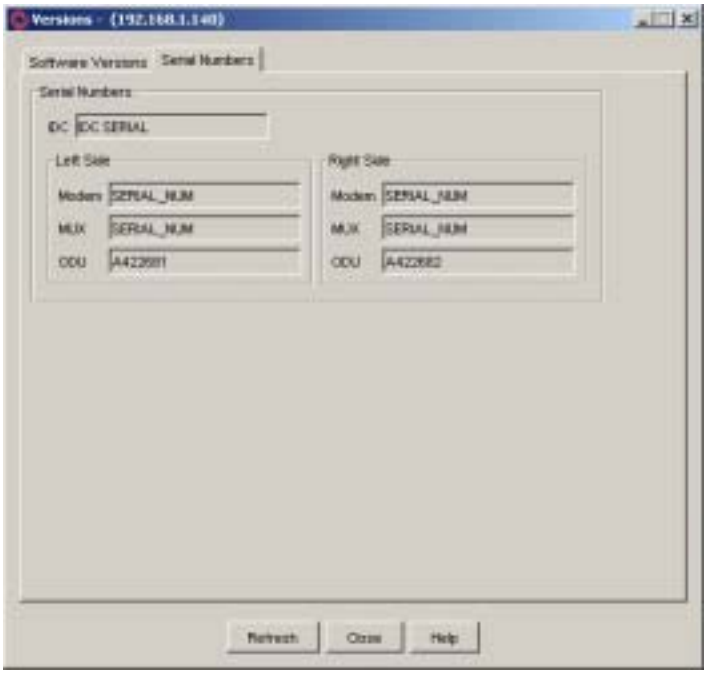


Figure 5-5 Serial Numbers Window

Software Download

This option enables you to download the latest software versions.

1. Select **File**, **System**, **Software Download**.

   The Software Download window appears.

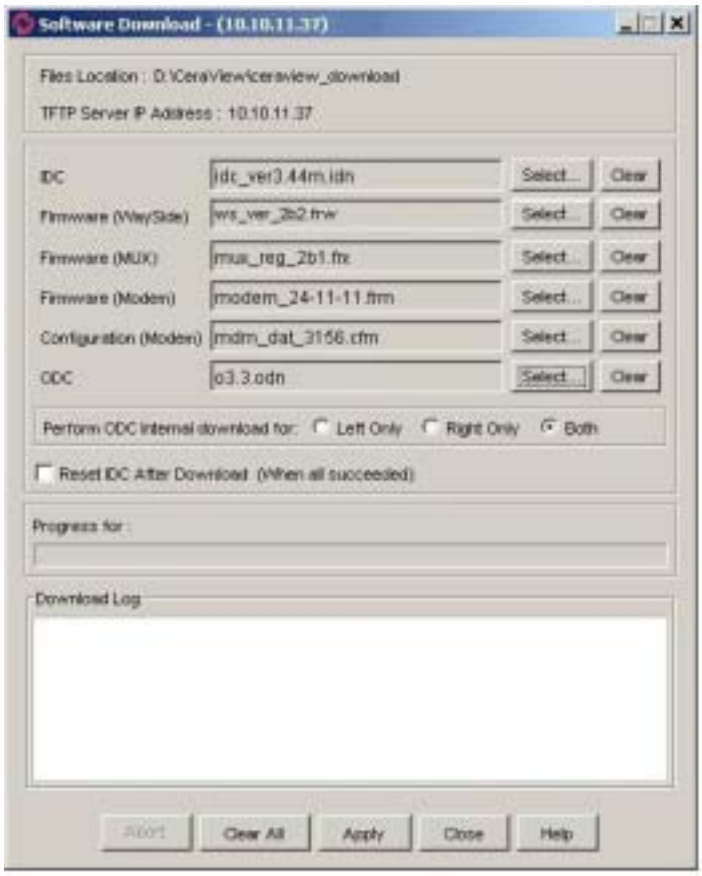


Figure 5-6 Software Download Window

2. The **Files Location** field shows the directory in which the software files are located.
3. The **TFTP Server IP Address** field shows the IP of the TFTP server used to download the software.
4. Click **Select** to choose the software file you want to download from a list that opens in a separate window.
5. Select an option for **Perform ODC Internal Download** if you want an internal ODC download for the right drawer, left drawer, or both drawers. If you select an option, the download will occur automatically after the ODC download is completed.
6. Select **Reset IDC after Download** if you want the unit to reset after the files are downloaded successfully.
7. In the Software Download window, click **Apply**.
8. The **Progress** bar in the Software Download window shows how the download process is progressing.

   To terminate the process, click **Abort**.

Results of the operation appear in the **Download Log** area.

Configuration Report

This option generates a report that includes various parameters and their values, such as system description, software versions, and Tx/Rx frequencies.

1. Select **File, Configuration Report**.

   The Configuration Report window appears.

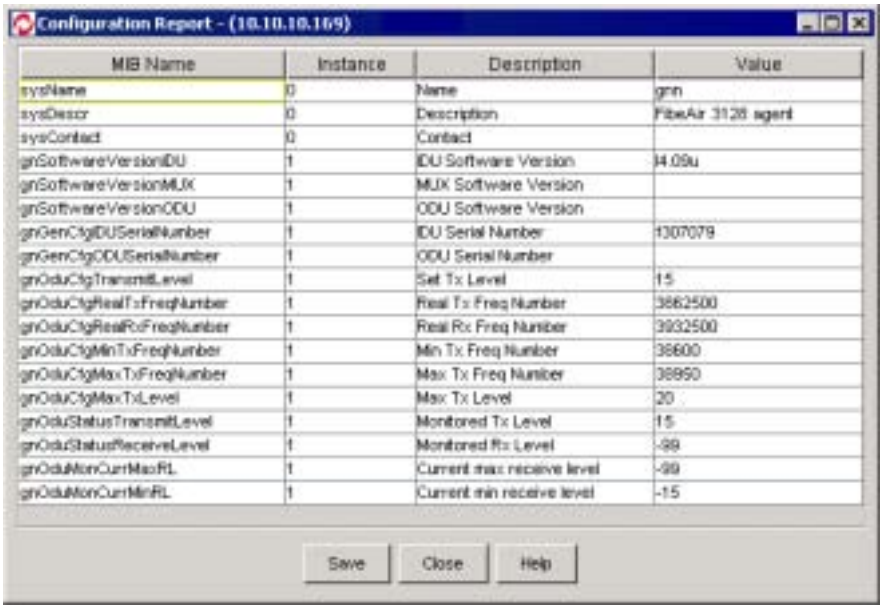

Configuration Report - (10.10.10.169)
MIB Name
Instance
Description
Value
sysName 0 Name grin
sysDescr 0 Description FibeAir 3128 agent
sysContact 0 Contact
gnSoftwareVersionIDU 1 IDU Software Version I4.09u
gnSoftwareVersionMUX 1 MUX Software Version
gnSoftwareVersionODU 1 ODU Software Version
gnGenCfgIDUSerialNumber 1 IDU Serial Number 1307079
gnGenCfgODUSerialNumber 1 ODU Serial Number
gnOduCfgTransmitLevel 1 Set Tx Level 15
gnOduCfgRealTxFreqNumber 1 Real Tx Freq Number 3862500
gnOduCfgRealRxFreqNumber 1 Real Rx Freq Number 3932500
gnOduCfgMinTxFreqNumber 1 Min Tx Freq Number 38600
gnOduCfgMaxTxFreqNumber 1 Max Tx Freq Number 38950
gnOduCfgMaxTxLevel 1 Max Tx Level 20
gnOduStatusTransmitLevel 1 Monitored Tx Level 15
gnOduStatusReceiveLevel 1 Monitored Rx Level -99
gnOduMonCurrMaxRL 1 Current max receive level -99
gnOduMonCurrMinRL 1 Current min receive level -15
Save
Close
Help

Figure 5-7 Configuration Report Window

2. Click **Save** to save the report in a file for later analysis.

Configuration File Upload/Download

This option enables you to upload a configuration file from a FibeAir unit to the management module, or download a file from the management module to the FibeAir unit.

1. Select **File, Configuration File, Upload from Element/Download to Element**.

   The Upload Configuration File or Download Configuration File window appears.

Figure 5-8 Upload/Download Configuration File Windows

2. When uploading, click **Browse**, and select the directory and name of the file you want the configuration to be uploaded into. Then click **Upload**.

   When downloading, click **Browse** and select the configuration file you want to download. Then click **Download**.

After the file is uploaded/downloaded, changes will take place only after the unit is reset.

AES (Advanced Encryption Standard)

When FibeAir 1500P is configured with encryption, data received from the line interface (plain text) is coded, and sent via the radio. The remote site will receive the data in its coded form, decode it back to plain text, and then send it on through the line to the user.

The encryption process used is the AES (Advanced Encryption Standard), which specifies a FIPS-approved cryptographic algorithm that can be used to protect electronic data.

The AES algorithm is a symmetric block cipher that can encrypt (encipher) and decrypt (decipher) information.

The user can select the encryption module's mode of operation, which may be either Automatic or Manual. Manual refers to the manual loading of the Master Key, and Automatic refers to the automatic loading of the Master Key.

To view AES information:

1. Select **File**, **AES**, **Left/Right**.

   The AES window appears.

Figure 5-9 AES Information Window

2. If AES (Advanced Encryption Standard) is configured for your system, this window displays the AES state and mode of operation. (Both the state and mode are configured via the terminal setup.)

New Session

Select this item to log in for a new CeraView session. The new session will appear in addition to the current session.

When you select this item, the CeraView login window appears for you to specify the IP address of the FibeAir unit you want to access.

Remote Session

Select this item to log in for a new CeraView remote session. The new session will appear in addition to the current session.

When you select this item, the CeraView login window appears for you to specify the IP address of the FibeAir unit you want to access.

Exit

Select this item to exit the CeraView application. You can also exit by clicking on the Close icon (x) in the title bar.

If you select **Exit** and a continuous logging operation is still active, you will be prompted to confirm the exit.

Note: It is recommended to use this option if you need to manage more than one FibeAir unit simultaneously.

Configuration Menu

IDU

External Alarms

The procedure detailed in this section is required only if alarms generated by external equipment are connected to the IDU, or if the IDU alarm outputs are connected to other equipment (using the alarms I/O connector).

1. Select **Configuration**, **IDU**, **External Alarms**, or click the **External Alarms** icon, or click the **Alarms In/Out** area in the physical view.

   The External Alarms window appears.

Figure 5-1 Input/Output External Alarms Window

The microcontroller in the IDU reads alarm inputs (dry contact) and transmits them to the CeraView management system. This allows FibeAir to report external alarms that are not related to its own system.

For each alarm on the left side of the window, do the following:

2. Click on the box next to the alarm number to enable/disable the alarm.
3. If you enable an alarm, enter a description of the alarm in the text field.
4. Select the alarm's severity level from the drop-down list (Major, Minor, Warning, Critical, or Event).
5. FibeAir 1500P provides three alarm outputs that can be used by other systems to sense FibeAir alarms. The outputs are configured in the **Alarm Outputs Relay Type** area.

   The alarm outputs are Form C Relays. Each output relay provides three pins, as follows: Normally Open (NO), Normally Closed (NC), Common (C).

   Output alarms can be defined as Major, Minor, Warning, External, Power, BER, Line, Loopback, LOF, IDU, ODU, Cable, or Remote.

   The default alarm output setting for all relays is Power.

The relays may be connected to customer-specific applications. Refer to Appendix B for details concerning the alarm connector pin assignments.

6. Click **Apply** to save the settings.
7. Click **Close**.

Wayside Channel (appears only if the channel is included)

1. Select **Configuration, IDU, AuxiliaryChannel**.

   The Auxiliary Channel Configuration window appears.

Figure 5-2 Auxiliary Channel Configuration Window

2. Select **EOW Cascade Enabled** and the **Right**/**Left** channel to activate the EOW (Engineer Order Wire) channel.
3. Select **Enable Right**/**Left** to activate the Wayside channel.

   The window above shows E1 Wayside channels. Different channels may appear (such as T1 or RJ-45 bridge) according to the system configuration.
4. Click **Apply** to save the settings.
5. Click **Close**.

Transport

The Transport Configuration window allows you to configure the communication protocol.

1. Select **Configuration, IDU, Transport**.

   The Transport Configuration window appears.

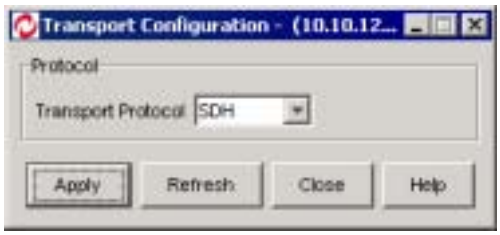
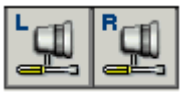


Figure 5-3 Transport Configuration Window

2. Click the drop-down list and select the protocol your radio is using.
3. Click **Apply** to save the settings.
4. Click **Close**.

ODU



1. Select **Configuration**, **ODU**, **Left/Right**, **ODU Configuration**, or click the Left/Right ODU Configuration icon.

   The ODU Configuration window appears.

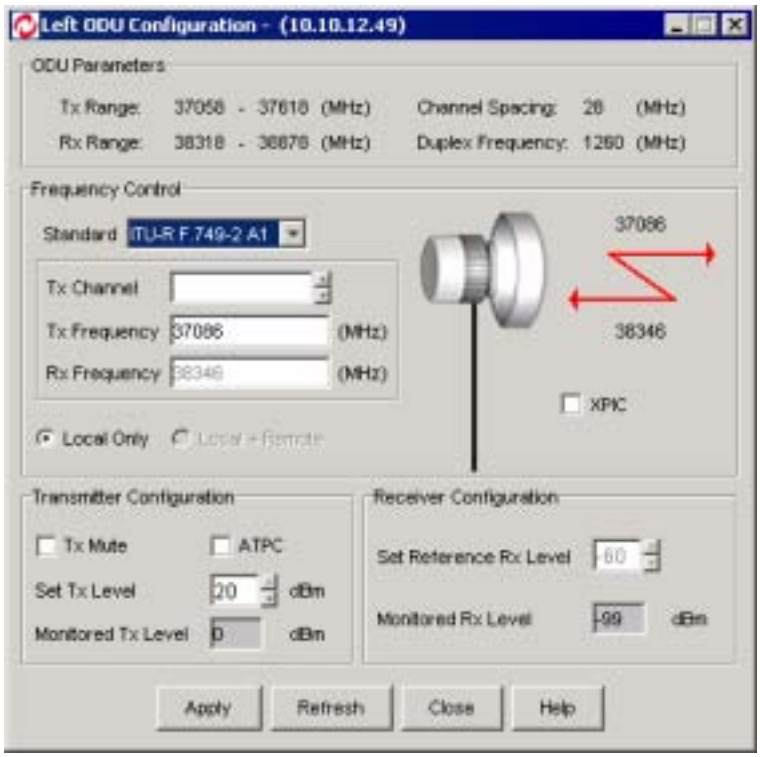


Figure 5-10 ODU Configuration Window

2. The **ODU Parameters** area is read-only.
3. For **Tx Channel**, click the up/down arrows to select the frequency channel you want to use.
4. For **Tx Frequency,** enter the frequency at which the system will transmit.
5. Select the **XPIC** option if you want to activate the XPIC mechanism.

   With FibeAir 1500P operating in co-channel dual polarization (CCDP) mode, using the cross polarization interference canceller (XPIC) algorithm, two STM-1 signals can be transmitted over a single 28 MHz channel, using vertical and horizontal polarization. This enables double capacity in the same spectrum bandwidth.

   Note: Setting XPIC for the right shelf will effect the left shelf as well, and vice versa.
6. In the **Transmitter Configuration** area, select **Tx Mute** to block transmission to the remote unit. By default, this option is not selected.

   Select **ATPC** to activate the Automatic Transmit Power Control feature.

   For **Set Tx Level**, enter or select the designated signal level. Possible range is -10 to max power level. By default, the transmit signal level is set to the maximum power level.

The **Monitored Tx Level** field (read-only) displays the system's transmitted power level.

7. In the **Receiver Configuration** area, the **Reference Rx Level** field should be set to the Rx level to which the actual level will be compared.

   The **Monitored Rx Level** field (read-only) displays the received power level.

8. Click **Apply** to save the settings.
9. Click **Close**.

Multi Rate Multi Constellation

This option allows you to set the modulation and bit rate of the system.

1. Select **Configuration**, **ODU**, **Left/Right**, **Multi Rate Multi Constellation**.

   The Multi Rate Multi Constellation window appears.

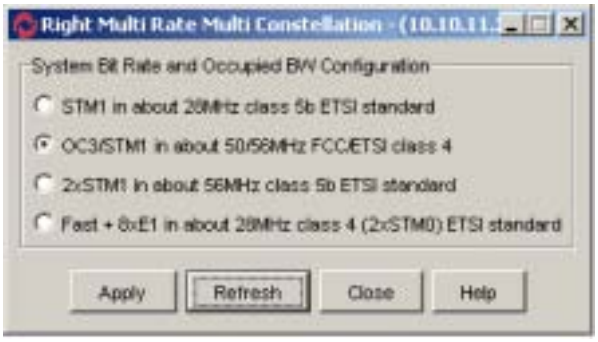

Right Multi Rate Multi Constellation - (10.10.11.
System Bit Rate and Occupied BW Configuration
STM1 in about 28MHz class 5b ETSI standard
OC3/STM1 in about 50/56MHz FCC/ETSI class 4
2xSTM1 in about 56MHz class 5b ETSI standard
Fast + 8xE1 in about 28MHz class 4 (2xSTM0) ETSI standard
Apply
Refresh
Close
Help

Figure 5-11 ODU Multi Rate Multi Constellation Window

2. Select a bit rate and an occupied bandwidth. The selection you make will determine the modulation (16/128 QAM), and the system will be configured accordingly.
3. Click **Apply**.

   Note: After you apply the setting, the relevant shelf will be reset.

4. Click **Close**.

Interfaces

STM1

1. Select **Configuration, Interfaces**, **Left/Right**, **STM1**, or click the **STM1** area in the physical view of the CeraView main window.

   STM1 Interface Configuration Window:

   Figure 5-12 STM1 Interface Configuration Window

   2 x STM1 Interface Configuration Window:

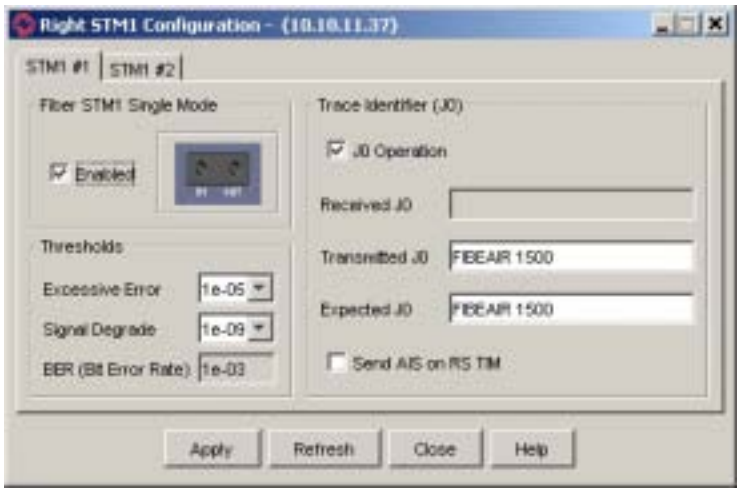


   Figure 5-13 2 x STM1 Interface Configuration Window

   In the configuration window for 2 x STM1, each interface is configured in a separate section by clicking the tabs at the top of the window.

2. In the **Fiber STM1 Mode** field, select **Enabled** if you want the channel to be active with alarm generation. If Enabled is not selected, the channel will be active, but no alarms will be generated.
3. In the **Excessive Error** field, select the level above which an Excessive BER alarm is issued for errors detected over the radio link.
4. In the **Signal Degrade** field, select the level above which a Signal Degrade alarm is issued for errors detected over the radio link.
5. The **BER** field shows the value above which a BER alarm is issued for errors detected over the radio link.

6. In the **Trace Identifier** area, select **J0 Operation** to use the J0 byte as a trace identifier in the SDH RSOH.

   If you activate J0, use the **Transmitted J0** and **Expected J0** fields to define the IDU identifier string.

   Select **Send AIS on RS TIM** if you want Alarm Indication Signals to be sent in the event of RS TIM (Trace Identification Mismatch).

7. Click **Apply** to save the settings.
8. Click **Close**.

Fast Ethernet

1. Select **Configuration, Interfaces**, **Left/Right**, **Fast Ethernet**, or click the Fast Ethernet interface area in the physical view of the CeraView main window.

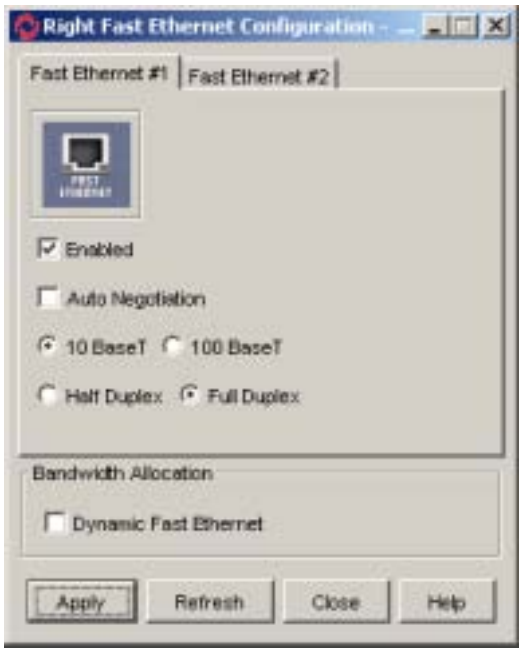


Figure 5-14 Fast Ethernet Interface Configuration Window

Note: Two Fast Ethernet tabs will appear only if the unit is configured with a 2 x Fast Ethernet port.

2. Select **Enabled** if you want the channel to be active with alarm generation. If Enabled is not selected, the channel will be active, but no alarms will be generated.
3. Select **Auto Negotiation** if you want the unit to determine the Fast Ethernet data transfer protocol automatically and operate accordingly.
4. If you did not select Auto Negotiation, select either **10BaseT** or **100BaseT**, and either **Half Duplex** or **Full Duplex**.
5. If the unit is configured with a 2 x Fast Ethernet port, for **Bandwidth Allocation**, select **Dynamic Fast Ethernet** for dynamic load balancing.
6. Click **Apply** to save the settings.
7. Click **Close**.

E1/T1

1. Select **Configuration, Interfaces**, **Left/Right**, **E1/T1**, or click the E1/T1 interface area in the physical view of the CeraView main window.

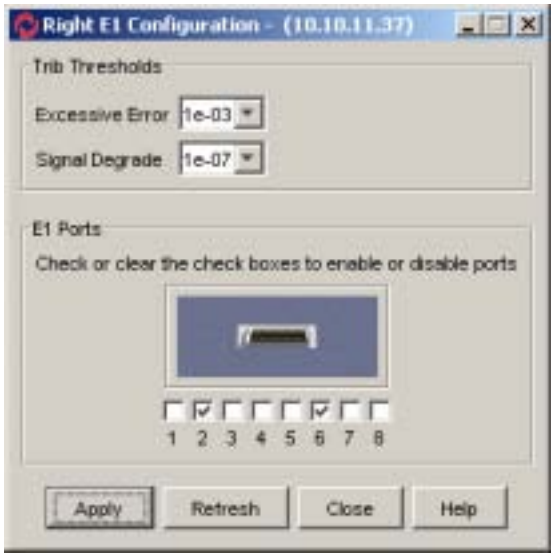


Figure 5-15 E1/T1 Interface Configuration Window

2. In the **Trib Thresholds** area, for **Excessive Error**, select the level above which an Excessive BER alarm is issued for errors detected over the radio link.

   For **Signal Degrade**, select the level above which a Signal Degrade alarm is issued for errors detected over the radio link.

3. In the **E1/T1 Ports** area, select the ports you want to enable.
4. Click **Apply** to save the settings.
5. Click **Close**.

Radio

1. Select **Configuration, Interfaces**, **Left/Right**, **Radio**, or click the **Radio** or **East** or **West** area in the physical view.

   The Radio Configuration window appears.

Figure 5-16 Radio Configuration Window

2. In the **Radio Thresholds** area, for **Excessive Error**, click the drop-down list and select the level above which an Excessive BER alarm is issued for errors detected over the radio link.

For **Signal Degrade**, select the level above which a Signal Degrade alarm is issued for errors detected over the radio link.

The **BER** field is read-only and shows the value above which a BER alarm is issued for errors detected over the radio link.

3. In the **Link Parameters** area, select the direction of the FibeAir radio. The direction you select will be indicated in the physical view.
4. For **Link ID**, specify the identification number of the link.

   Note: When working with an IDU that has the LINK ID feature on one end and an IDU that does not have this feature on the other end, set the LINK ID to 1.
5. Click **Apply** to save the settings.
6. Click **Close**.

Management System

IP Configuration

1. Select **Configuration**, **Management System**, **IP Configuration**.

   The IP Configuration window appears.

Figure 5-17 IP Configuration Window

2. In the **Ethernet Addresses** area, specify the **Ethernet IP Mask** and **Default Router IP Address**.
3. In the **Serial NMS** area, specify the **IP Mask**, **Baud Rate**, and **Modem Phone Number**.
4. Click **Apply** to save the changes.
5. Click **Close**.

Trap Forwarding

Used to configure traps sent from a Network Element to the NMS system.

To configure traps sent from Ceragon's NMS to other NMS systems, see *Trap Forwarding Configuration Utility* at the beginning of this chapter.

1. Select **Configuration**, **Management System**, **Trap Forwarding**, or click the Trap Forwarding icon.

   The Traps Configuration window appears.

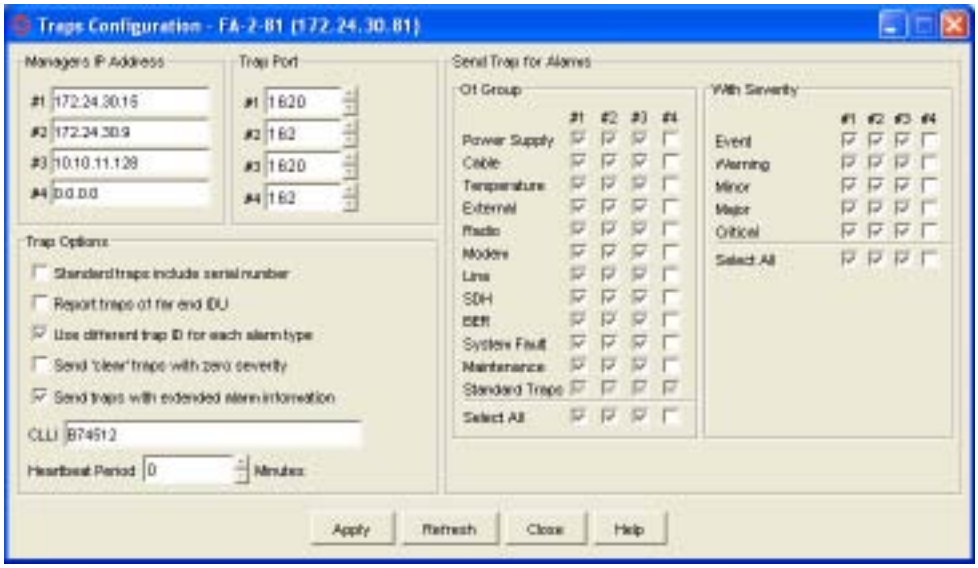


Figure 5-18 Traps Configuration Window

2. In the **Managers IP Address** area, specify the IP addresses of the managers to which you want traps to be sent.
3. For each manager IP you specify, specify the **Trap Port**.
4. In the **Send Trap for Alarms** area, for **of Group**, you determine which alarms will be sent as SNMP traps to each manager. In each manager column, select the alarm types you want to include for that manager. To select/deselect all traps in a column, click the **Select All** checkbox at the bottom of the column.
5. For **with Severity**, select the severity filter to determine which types of alarms will be forwarded. To select/deselect all alarm types in a column, click the **Select All** checkbox at the bottom of the column.
6. In the **Trap Options** area, select **Standard traps include serial number** if you want trap messages to include the IDU serial number.

   Select **Report local traps of far end IDU** if you want remote IDU trap messages to be reported locally.

   Select **Use different ID for each alarm type** if you want each type of alarm to receive a unique ID.

   Select **Send "clear" traps with zero severity** if you want to receive information concerning "clear" traps.

   Select **Send traps with extended alarm information** if you want the Alarm ID, origin, and unit from the current alarm table to be added to the end of each FibeAir-related trap.

7. For **CLLI** (Common Language Location Identifier), enter up to 18 characters that will represent your system ID when traps are sent.
8. For **Heartbeat Period**, a heartbeat signal will be generated every x minutes (the number you enter) to tell your system that the trap meachnism is working.
9. Click **Apply** to save the settings.
10. Click **Close**.

In-band Configuration

In-band configuration is performed when you want to work with In-band Management. In-band Management refers to a method whereby the network management software sends management packets through the same network it is managing. This differs from out-of-band management in which the network management software uses a different network (overlay network) in order to communicate with the managed elements.

FibeAir 1500P allows you to choose one or two channels for in-band management, as follows:

- One channel of any type
- One PPPoE channel (virtual management channel) + one other channel of any type
- Two radio channels
- One radio channel and one fiber channel

Note: You cannot choose two fiber channels.

To configure In-Band Management:

1. Select **Configuration**, **Management System**, **In-band**.

   The In-band Configuration window appears.

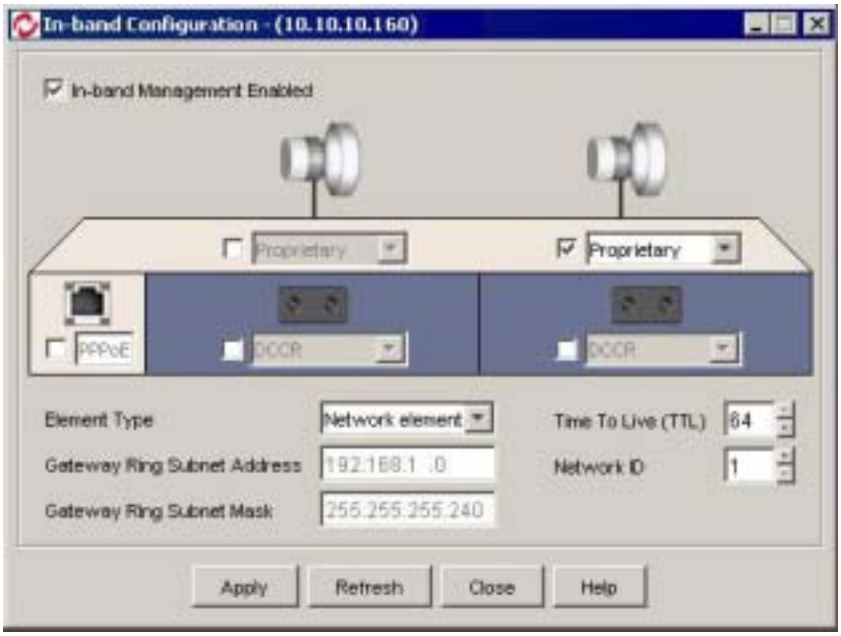


Figure 5-19 In-Band Configuration Window

2. Select **In-Band Management Enabled** to activate this management method.

3. If you enabled In-Band Management, select the channels you want to use for in-band management data transfer, and select the communication method (DCCR, DCCM, or Proprietary).
4. Click the **Element Type** drop-down list and select the type of element.

   If you selected **Gateway**, specify the **Gateway Ring Subnet Address** and the **Gateway Ring Subnet Mask**.
5. For **Time To Live**, use the up/down arrows to select the desired value.
6. For **Network ID**, use the up/down arrows to select the ID.
7. Click **Apply** to save the changes.
8. Click **Close**.

SNMP Configuration

1. Select **Configuration**, **Management System**, **SNMP Configuration**.

   The SNMP Configuration window appears.

Figure 5-20 SNMP Configuration Window

2. For **Read Community**, enter the community name for read-only access.

   For **Write Community**, enter the community name for read-write access.

   For **Trap Community**, enter the community name for trap forwarding.
3. Click **Apply** to save the settings.
4. Click **Close** to close the window.

Note: Changes to community settings will take effect only after the unit is reset.

NTP Configuration

NTP (Network Time Protocol) configuration is performed when an NTP server is used to synchronize network activity.

1. Select **Configuration**, **Management System**, **NTP**.

   The NTP Configuration window appears.

Figure 5-21 NTP Configuration Window

2. Enter the IP of the NTP server.
3. For **NTP Update Interval**, use the up/down arrows to select the amount of time (minutes) between synchronization updates.
4. For **Offset from GMT**, use the arrow buttons and the drop-down list to select the amount of time required to compensate for offset from the GMT (Greenwich Mean Time).
5. For **Daylight Saving Time Offset**, click the arrow buttons to set the amount of time required to compensate for daylight saving.
6. For **Daylight Saving Time Start**, click **Configure** to set the beginning of the daylight saving time period.
7. For **Daylight Saving Time End**, click **Configure** to set the end of the daylight saving time period.
8. Select **Enable NTP Authentication** for secure access to the NTP server.

   If you enable NTP, enter the **Authentication Public Key**, and the **Authentication Secret Key** numbers.
9. Click **Apply** to save the settings.
10. Click **Close** to close the window.

Alarms Menu

Current Alarms

1. Select **Alarms**, **Current Alarms**, or click the Current Alarms icon.

   The Current Alarms window appears.

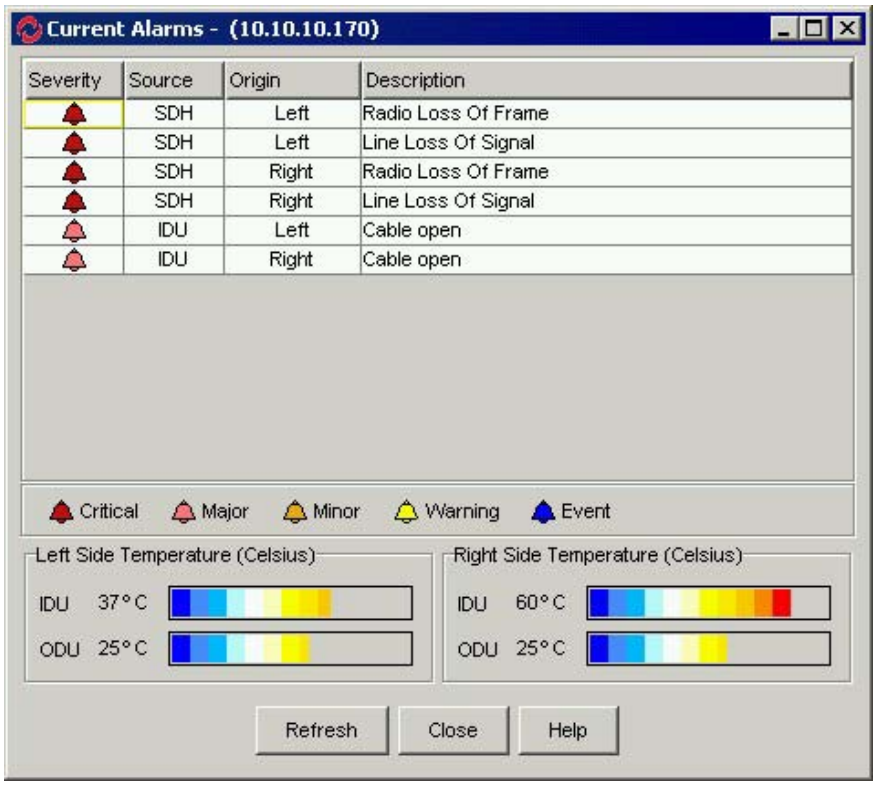


Figure 5-22 Current Alarms Window

Each line in the window describes a different alarm.

The source of the alarm appears in the **Source** column.

The color in the **Severity** column indicates the severity of the alarm, as shown at the bottom of the alarm list.

The unit associated with the alarm is indicated in the **Origin** column.

Note: You can click on a column title to sort the information in the table accordingly.

In addition to the current alarms, the current IDU and ODU temperatures are shown at the bottom of the window.

Alarm Log

1. Select **Alarms**, **Alarm Log**, or click the Alarm Log icon.

   The Alarm Log window appears.

Alarm Log - (10.10.10.160)
Severity Filter
Critical
Major
Minor
Warning
Event
Time and Date
Severity
Origin
Description
31-Aug-91 15:56:50 Right RAISED LOS ON FIBER # 1
31-Aug-91 15:56:50 Right RAISED LOF ON RADIO # 1
31-Aug-91 15:56:49 Right RAISED CARR CABLE OPEN
31-Aug-91 15:56:46 Right CLEARED MUX_UNIT_FAIL
31-Aug-91 15:56:46 Right RAISED NO SIGNAL FROM ODU
31-Aug-91 15:56:18 Right CLEARED MODEM_UNIT_FAIL
31-Aug-91 15:56:18 Right RAISED MUX_UNIT_FAIL
31-Aug-91 15:56:18 Right RAISED MODEM_UNIT_FAIL
31-Aug-91 15:56:18 Right RAISED ODU_COMM_FAIL
31-Aug-91 15:56:18 Right CLEARED ODU_COMM_FAIL
31-Aug-91 15:54:21 Left RAISED CARR CABLE OPEN
31-Aug-91 15:54:18 Left RAISED LOS ON FIBER # 1
31-Aug-91 15:54:18 Left RAISED LOF ON RADIO # 1
31-Aug-91 15:54:14 Left CLEARED MUX_UNIT_FAIL
31-Aug-91 15:54:14 Left RAISED NO SIGNAL FROM ODU
31-Aug-91 15:53:47 Left CLEARED MODEM_UNIT_FAIL
Clear Log
Save
Refresh
Close
Help

Figure 5-23 Alarm Log Window

The Alarm Log displays the last 200 alarms that occurred. If the number of alarms exceeds 200, the first alarms will be removed.

Note: The alarms in the window are not saved in a file, unless you click **Save**.

The window displays the following information:

Time - The time the alarm was triggered.

Date - The date the alarm was triggered.

Severity - The severity of the alarm. You can determine which severity levels will be displayed in the window by selecting the levels at the top of the window.

Origin - The shelf containing the unit that generated the alarm.

Description - A description of the alarm, and its status (RAISED, CLEARED).

Note: You can click on a column title to sort the information in the table accordingly.

To clear the alarm list in the window, click **Clear Log**.

To save the current alarm list in a file, click **Save**.

Continuous Alarm Logging

To save alarms in a continuous logging file, select **Alarms**, **Start Saving Log**.

In the Choose Alarm Log File window that appears, select the file you want to save the alarms to and click **Save**.

Alarms will be added to the file you selected until you select **Stop Saving Log**. or exit the application. If you exit CeraView and the log file is still active, you will be notified.

Performance Menu

Radio

RSL

The RSL Performance Monitoring window displays received signal level values measured over the past 24 hours.

1. Select **Performance**, **Radio**, **Left/Right**, **RSL**.

   The RSL Monitoring graphic window appears.

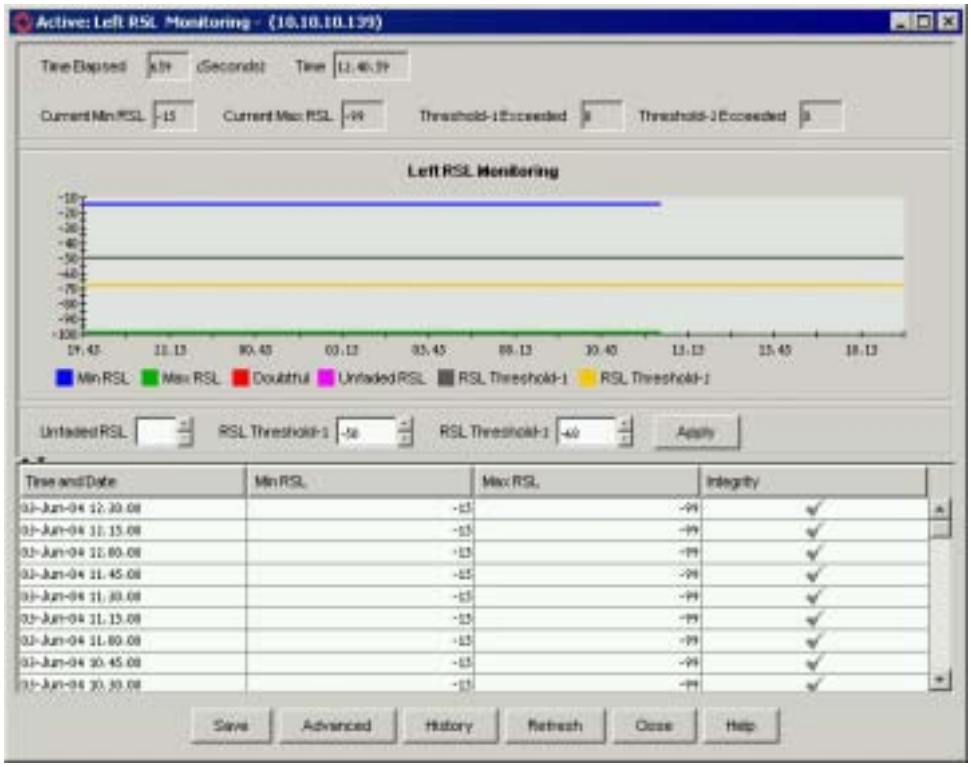


Figure 5-24 RSL Current Monitoring Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes). The Threshold Exceeded counters at the top of the window display the number of seconds threshold values were exceeded during the current interval.

Current Min RSL values are the minimum received level measured during the interval.

Current Max RSL values are the maximum received level measured during the interval.

Unfaded RSL is the theoretical expected RSL value (not the actual value), which can be calculated by the user (as a function of distance, frequency, etc.). The value is used only for reference purposes.

RSL Threshold 1 and RSL Threshold 2 are values that you can set. When an RSL value exceeds the thresholds you set, the Threshold Exceeded counters at the top of the PM window will display the number of seconds the threshold values were exceeded.

Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

The monitoring table displays RSL values over the last 24 hours. The values are the same as those that appear in the graph, only in table format.

The Min RSL column shows the minimum received level measured during the interval.

The Max RSL column shows the maximum received level measured during the interval.

The Integrity column indicates whether or not the values received at that time and date are reliable. A red x icon in the column indicates that the values are not reliable due to a possible power surge or power failure event that occurred at that time. (This column corresponds to the Doubtful indication in the graphic window.)

Click Advanced for the additional Threshold 1 Exceeded and Threshold 2 Exceeded columns, which list the number of times RSL thresholds specified in the main RSL Monitoring window were exceeded.

2. To view daily RSL values over a one-month period, click **History**.

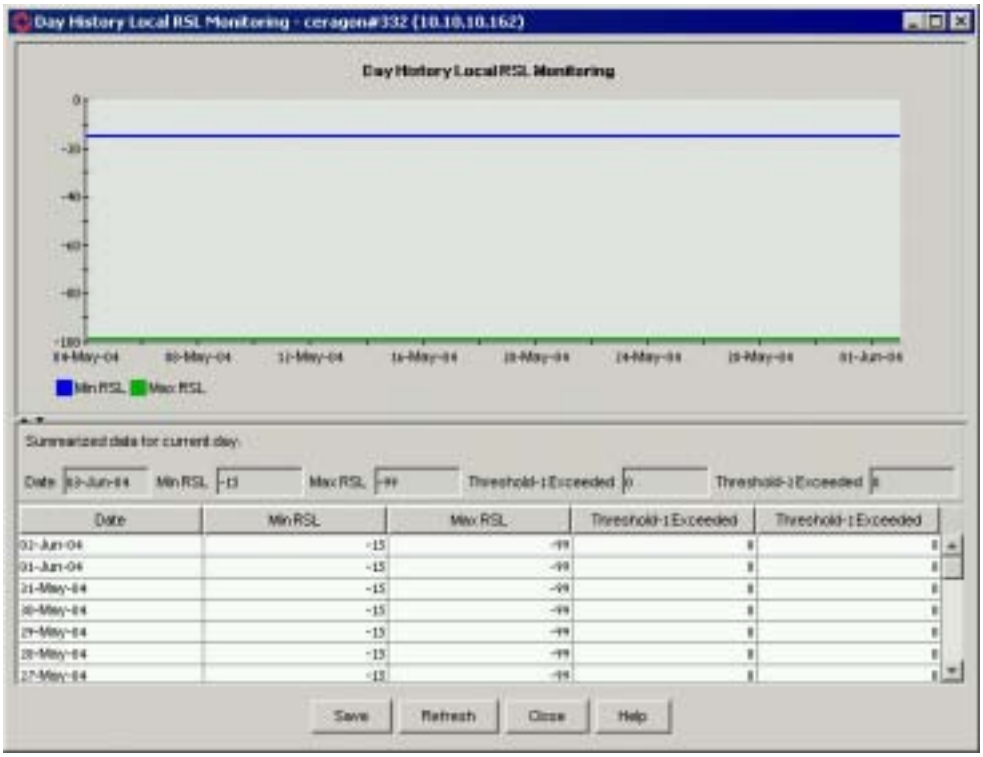


Figure 5-25 RSL Monitoring History Window

The values shown in the window are values that were received over the last 30 days.

Note: Since the current day's data is not complete until the end of the day, its partial data is presented above the main table area.

Click **Save** to save current values in the table to a file.

TSL

The TSL Performance Monitoring window displays details about the transmitted signal level measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Radio**, **Left/Right**, **TSL**.

   The TSL Monitoring graphic window appears.

Figure 5-26 TSL Monitoring Graphic Window

   Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes). The Threshold Exceeded counter at the top of the window displays the number of seconds the threshold value was exceeded during the current interval.

   Current Min TSL values are the minimum transmitted level measured during the interval.

   Current Max TSL values are the maximum transmitted level measured during the interval.

   TSL Threshold is a value that you can set. When a TSL value exceeds the threshold you set, the Threshold Exceeded counter at the top of the PM window will register and display the number of seconds the threshold value was exceeded.

   Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

   The format of the monitoring table is similar to the RSL table described above.

2. To view Historical RSL values, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

SDH

The SDH Performance Monitoring window displays the number of radio UAS (unavailable seconds), measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Radio**, **Left/Right**, **SDH**.

   The SDH Monitoring graphic window appears.

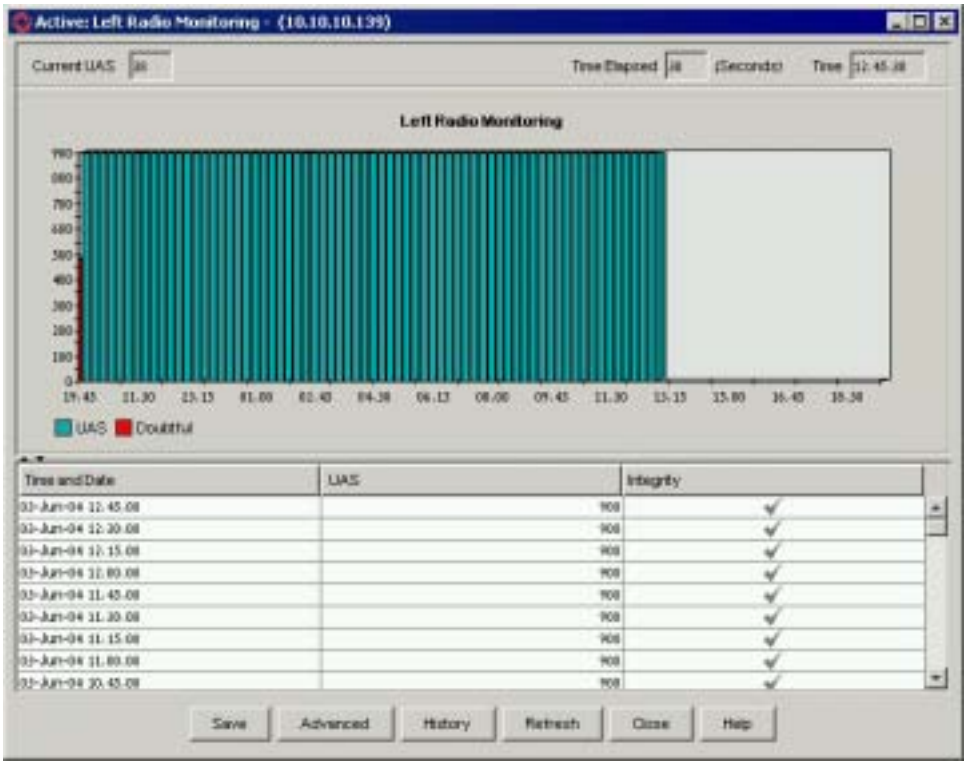


Figure 5-27 SDH Monitoring Graphic Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

Current UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

The format of the UAS monitoring table is similar to the RSL table described above.

Line

The Line Performance Monitoring window displays the number of line UAS (unavailable seconds), measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Line**, **Left/Right**.

   The Line Monitoring graphic window appears.

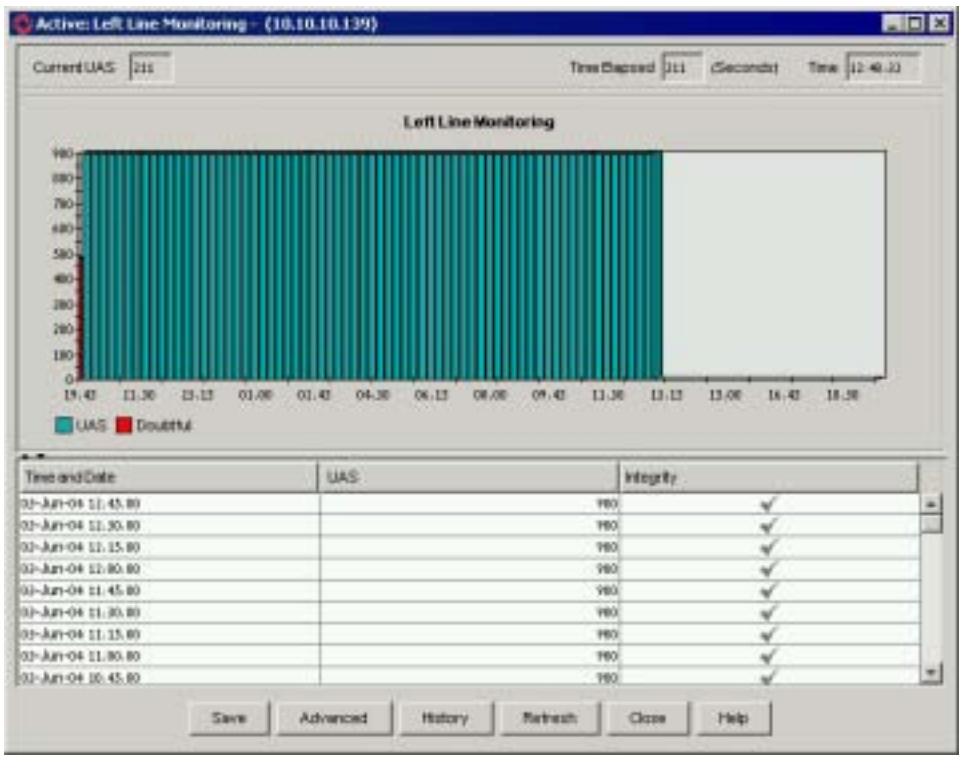


Figure 5-28 Line Monitoring Graphic Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

The format of the UAS monitoring table is similar to the RSL table described above.

Maintenance

Loopback

1. Select **Maintenance**, **Loopback, Left/Right**, or click the Left/Right Loopback icon.

   The Loopback window appears.

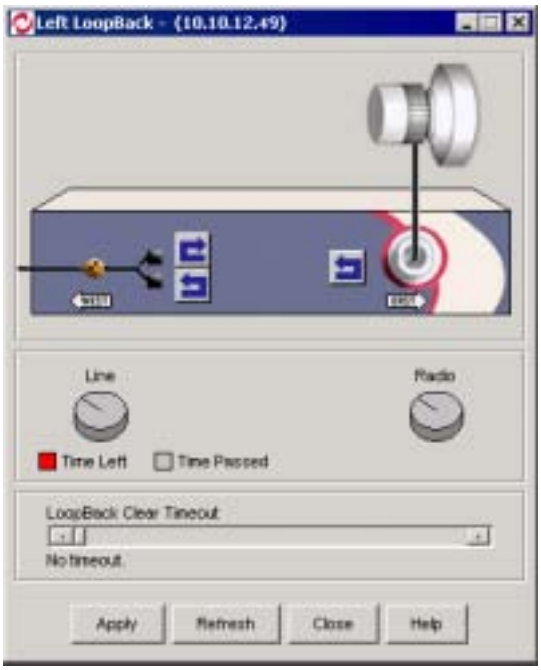


Figure 5-29 Loopback Window

2. Click the upper button on the west side to select an external radio loopback test.

   Click the lower button on the west side to select an internal radio loopback test.

   Click the button on the east side to select an external line loopback test.

3. Set the **LoopBack Clear Timeout** scale to the amount of time you want the test to run.

   When a radio or line loopback test is running, a pie display above the timeout scale shows how much time is left for the test (see the figure above).

4. Click **Apply** to run the test.

5. When you are done with loopback testing, click **Close** to close the window.

   Note that closing the window will not stop the loopback test. To stop a test, unmark it by clicking on the relevant arrow button, and then click Apply.

Neighbors

The Neighbors window displays a table of all STM-1 interfaces (radio, line, trib) and their remote connections.

1. Select **Maintenance**, **Neighbors**.

   The Neighbors window appears.

Figure 5-30 Neighbors Window

2. Select **Manual** in the **Detect Mode** column to enter the unit's IP address manually.

   When you enter an IP address, CeraView will try to connect to the unit and learn the Neighbor Type and Interface.

   If the IP address you entered is not configured or not able to be reached, the Neighbor Type field will display “Unknown”, and the Neighbor Interface field will list all available options than can be configured.

Software Reset

Select **Maintenance**, **Software Reset** to reset the software for maintenance purposes, as follows:

IDC Performs a software reset for the Indoor Unit Controller.

Left ODC Performs a software reset for the Left Outdoor Unit Controller.

Right ODC Performs a software reset for the Right Outdoor Unit Controller.

Hardware Reset

Select **Maintenance**, **Hardware Reset** to reset the hardware for maintenance purposes, as follows:

IDC Performs a hardware reset of the Indoor Unit Controller.

Left/Right Drawer: Performs a hardware reset of the right/left drawer.

Left/Right ODC Performs a hardware reset of the right/left Outdoor Unit Controller.

Clear PM

Select this item to reset Performance Monitoring in the unit (the number of available intervals will be 0).

The options include:

Entire PM Data - clears the performance monitoring log files for both the left and right units.

Left PM Only - clears the performance monitoring log files for the left shelf only.

Right PM Only - clears the performance monitoring log files for the right shelf only.

Set Default Configuration

Select this item to reload the default system configuration.

The options include:

Entire Configuration - sets default values for the IDC, ODC, and MUX.

IDC Configuration - sets default values for the IDC only.

Left Mux Configuration - sets default values for the left unit MUX only.

Right Mux Configuration - sets default values for the right unit MUX only.

Force Far End Tx Level

Select this item to force the remote Tx level to the value set for the local IDU.

Force Far End Mute Off

Select this item to enable remote ODU transmission.

Protection

Protection Type

1. Select **Protection**, **Protection, Protection Type**.

   The Protection Type window appears.

Figure 5-31 Protection Type Window

2. Select one of the following options:

   Protection Disabled - to disable protection.

   Internal Protection, Dual Drawer - to activate internal protection, whereby the left drawer will function as the active (primary) unit and the right drawer will function as the standby (secondary) unit.

   External Protection, Dual Drawer - to activate external protection, whereby the IDU will be linked for protection purposes to another IDU. When this option is used, the main window will include tabs at the top showing the active and standby units.

3. Click **Apply** to save the settings.
4. Click **Close** to close the window.

Protection Configuration

1. Select **Protection**, **Protection Configuration**.

   The Protection Configuration appears.

Figure 5-32 Protection Configration Window

2. In the **Protection Switch Criteria** area, select the criteria that will cause a protection switch (only if Off is selected for Protection Lockout).
3. In the **Line Output** area, select either a single or dual fiber input.
4. Click **Apply** to save the settings.
5. Click **Close** to close the window.

Diveristy Configuration

1. Select **Protection**, **Diversity**, **Diversity Configuration** to configure Diversity parameters (if the feature was installed).

   The Diversity Configuration window appears.

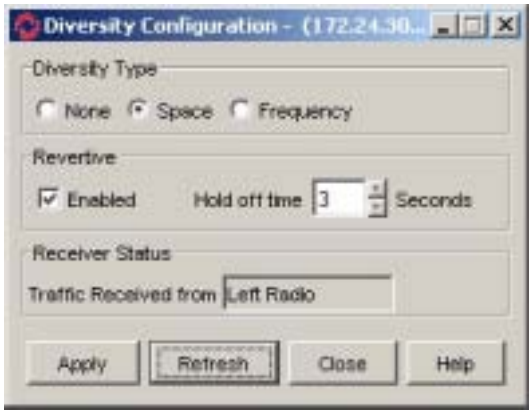


Figure 5-33 Diversity Configuration Window

2. For systems in which the Hitless feature was configured, select **Enabled** to activate the feature.
3. For systems in which the Hitless feature was configured, in the **Diversity Type** area, select either **Space** or **Frequency** diversity.
4. For **Revertive**, select **Enabled** if you want normal traffic on the protection path to be switched back to the original path after it recovers from a fault.

   Revertive mode may be required to support specific services, whereby the shortest physical route offers better performance.

   If you don't select Revertive, no switching to the original fault-cleared path will be performed to prevent unnecessary traffic hits and management event reports.
5. If you selected Enabled, for **Hold off Time** use the arrow buttons to set the delay period between fault detection and path switching. The value can be from 0 to 10 seconds. The default is 0 seconds.
6. The **Receiver Status** area shows the last radio from which data was received.
7. Click **Apply** to save the settings.
8. Click **Close** to close the window.

Protection Commands

Copy Configuration

This option causes the configuration of one unit (left or right) to be copied to the other.

1. Select **Protection**, **Commands**, **Copy Configuration**, **IDU to Mate/Left to Mate/Right to Mate**.

   IDU to Mate will copy the IDU configuration to another IDU.

   Right to Mate will copy the right drawer configuration to the left drawer.

   Left to Mate will copy the left drawer configuration to the right drawer.

2. In the confirmation message that appears, click **Yes**.

Request Switch

This option requests a switch between the active and standby radios.

1. Select **Protection**, **Commands**, **Request Switch**.
2. In the confirmation message that appears, click **Yes**.

Force Switch

This option forces a switch between the active and standby radios.

1. Select **Protection**, **Commands**, **Force**, **Force Switch/Clear Force**.
2. In the confirmation message that appears, click **Yes**.
3. To disable the Force Switch option, select **Clear Force**.

Lockout

This option prevents protection switching from occurring.

1. Select **Protection**, **Commands**, **Lockout**, **Lockout/Clear Lockout**.
2. In the confirmation message that appears, click **Yes**.
3. To disable the Lockout option, select **Clear Lockout**.

Diversity Protection Commands

Request Switch

This option requests a switch between the active and standby radios.

1. Select **Protection**, **Diversity, Commands**, **Request Switch**.
2. In the confirmation message that appears, click **Yes**.

Lockout

This option prevents protection switching from occurring.

1. Select **Protection**, **Diversity, Commands**, **Lockout**, **Lock to Left Radio/Lock to Right Radio**.
2. In the confirmation message that appears, click **Yes**.
3. To disable the Lockout option, select **Clear Lockout**.

CeraView for FibeAir 1500AL

The following sections describe the CeraView application for FibeAir 1500AL.

For information about system requirements and the CeraView installation procedure, see the section *General* at the beginning of this chapter.

For information about the CeraView Configuration utility, see the section *CeraView Configuration* at the beginning of this chapter.

For information about logging in to CeraView, see the section *Logging in to CeraView* at the beginning of this chapter.

Main Window

After you log in to CeraView, the Main window appears.

The Main window is your starting point for all operations.

Below is a description of the menus, toolbars and other features of the Main window.

CeraView Release 1.84 LA-FA-30 (10.10.11.30)
File Configuration Alarms Performance Maintenance Protection Help
LA-FA-30 (10.10.11.30)
LA-FA-30 (10.10.11.30)

Figure 5-1 CeraView for FibeAir 1500AL Main Window

Title Bar

The Title Bar displays the CeraView version and the IP address of the IDU being accessed.

Menu Bar

The Menu Bar contains menus and menu items used to perform CeraView operations.

Toolbar

The Toolbar includes several icons that you can click to perform different operations.

Each icon in the Toolbar is described in the table below.

Icon	Operation
	System Information - used to view and define system information, such as contact personnel and system up time.
	Trap Forwarding Configuration - used to designate managers to which traps will be forwarded.
	Current Alarms - used to view current active alarms.
	Alarm Log - used to view hisorical alarm records.
	External Alarms - used to configure alarms sent to/from external sources.
	Transport Configuration - used to configure the communication protocol.
	Trail Configuration - used to configure the tributaries.
	Loopback - used to configure and run loopbacks for testing and troubleshooting.
	Online Help - used to view the online help file.

Physical View

A physical view of the FibeAir unit is displayed in the Main window. The view provides a real-time virtual display of the IDU front panel.

Figure 5-2 Physical View in Main Window

The LEDs that appear on the left side in the physical view indicate the actual real-time status of the LEDs on the front panel of the IDU. (LED changes on the actual front panels of the units will be updated in the physical views after a slight delay.)

The LEDcolors are as follows:

Green - indicates proper operation

Yellow - indicates a warning

Red - indicates a major alarm or severe malfunction

The following table lists the LEDs and their indications.

LED	Color			Description
	Red	**Yellow**	**Green**	
Power	X		X	**Red** - power supply problem, system not functional
Line	X	X	X	**Red** - no input to main channel / High BER **Yellow** - J0 mismatch
LOF (Loss of Frame)	X		X	**Red** - radio did not recognize information frame (radio link problem/radio LOF)
BER (Bit Error Ratio)	X	X	X	**Red** - radio BER higher than radio excessive error threshold definition (see Sonet/SDH configuration window) **Yellow** - radio BER higher than radio signal degrade threshold definition (see Sonet/SDH configuration window)
LPBK (Loopback)	X		X	**Red** - loopback is active
STBY (Standby)		X	X	**Yellow** - Protected configuration. The unit is currently passive or Tx mute is operating
IDU	X	X	X	**Red** - modem unlocked **Yellow** - high temperature / fan problem
CBL (Cable)	X		X	**Red** - RF cable open / RF cable short
RMT (Remote Unit)	X	X	X	**Red** - no link / remote unit problem (red LED is lit in the remote unit) **Yellow** - warning in remote unit (yellow LED is lit in the remote unit)
8xE1/T1			X	**Green** - Connected E1/T1 tributary

Menus

The following sections describe the CeraView window menus.

File Menu

System Information

This option allows you to view and define information for the FibeAir system.

1. Select **File**, **System, Information.**, or click the System Information icon.

   The System Information window appears.

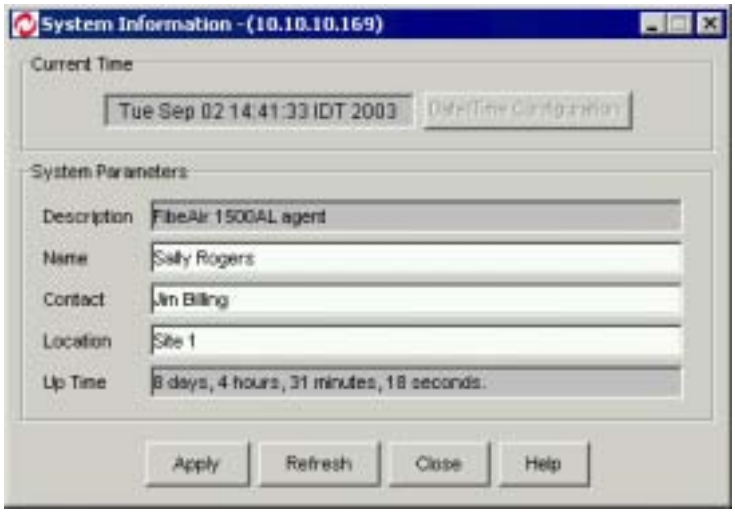


Figure 5-3 System Information Window

2. In the **Current Time** area, click **Date/Time Configuration** and set the date and the time (in the format HH:MM:SS).
3. The read-only **Description** field provides information about the FibeAir system.
4. (Optional) In the **Name** field, enter a name for this link. By convention, this is the node's fully-qualified domain name.
5. (Optional) In the **Contact** field, enter the name of the person to be contacted when a problem with the system occurs. Include information on how to contact the designated person.
6. (Optional) In the **Location** field, enter the actual physical location of the node or agent.
7. The **Up Time** field is read-only and shows how long the system has been operating continuously.
8. Click **Apply** to save the settings.
9. Click **Close**.

Versions

The Versions window displays current software versions and relevant serial numbers. It also displays software versions that will take effect after the unit is reset.

1. Select **File**, **System**, **Versions**.

   The Versions window appears.

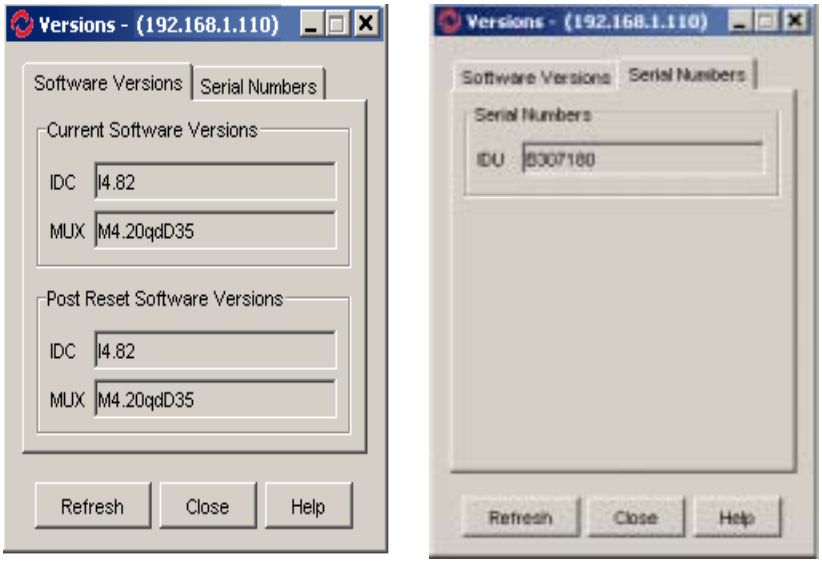


Figure 5-4 Versions Window

2. Click the **Serial Numbers** tab for a list of component serial numbers.

Configuration Report

This option generates a report that includes various parameters and their values, such as system description, software versions, and serial numbers.

1. Select **File, Configuration Report**.

   The Configuration Report window appears.

Figure 5-5 Configuration Report Window

2. Click **Save** to save the report in a file for later analysis or downloading.

Configuration File Upload/Download

This option enables you to upload a configuration file from a FibeAir unit to the management module, or download a file from the management module to the FibeAir unit.

1. Select **File**, **Local/Remote**, **Configuration File, Upload from Element/Download to Element**.

   The Upload Configuration File or Download Configuration File window appears.

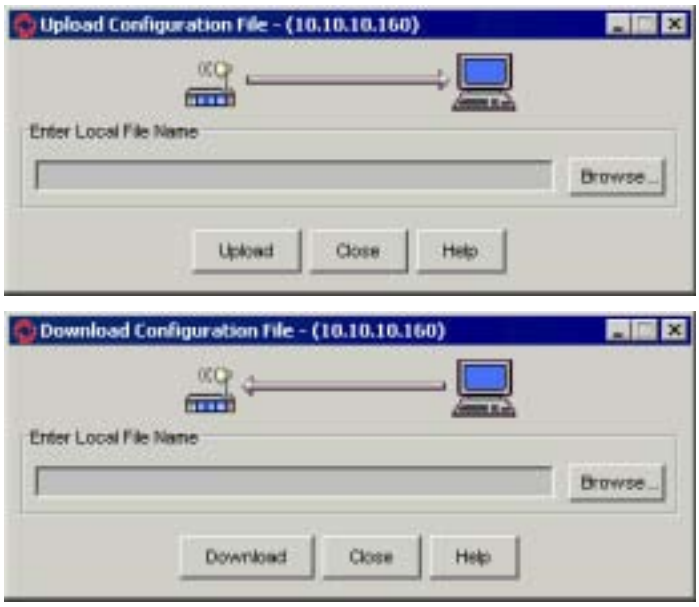


Figure 5-6 Upload/Download Configuration File Windows

2. Click **Browse**, locate the configuration file you want to use, and click **Upload** or **Download**.

After the file is uploaded or downloaded, changes will take place only after the unit is reset.

Software Download

This option enables you to download IDU and MUX software updates.

1. Select **File, Software Download**.

   A window appears for you to define the software download procedure.

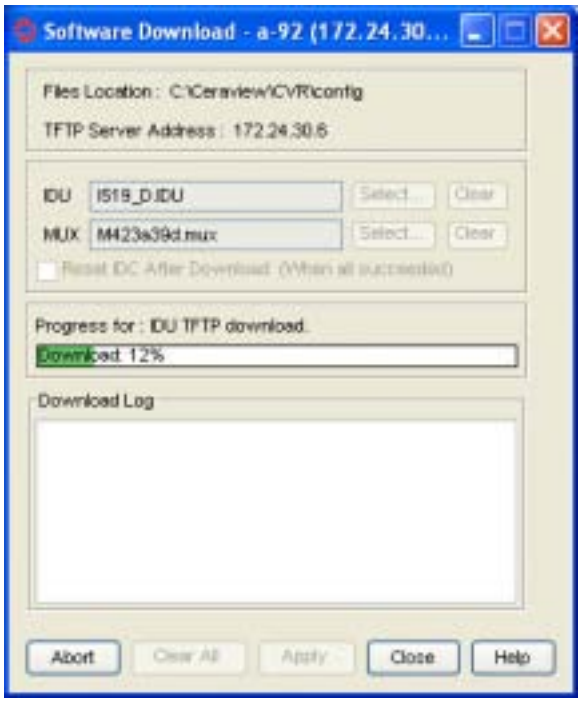


Figure 5-7 Software Download Window

2. Click **Select** to choose the software file you want to download.
3. In the Software Download window, click **Apply**.

   The software file you chose is downloaded and a progress report appears in the Download Log area.

New Session

Select this item to log in for a new CeraView session. The new session will appear in addition to the current session.

When you select this item, the CeraView login window appears for you to specify the IP address of the FibeAir unit you want to access.

Exit

Select this item to exit the CeraView application. You can also exit by clicking on the Close icon (x) in the title bar.

When you exit CeraView, you will be prompted to confirm the exit. Click **OK** to confirm the operation.

Configuration Menu

IDU

External Alarms

The procedure detailed in this section is required only if alarms generated by external equipment are connected to the IDU, or if the IDU alarm outputs are connected to other equipment (using the alarms I/O connector).

1. Select **Configuration**, **IDU**, **External Alarms**, or click the **External Alarms** icon.

   The External Alarms window appears.

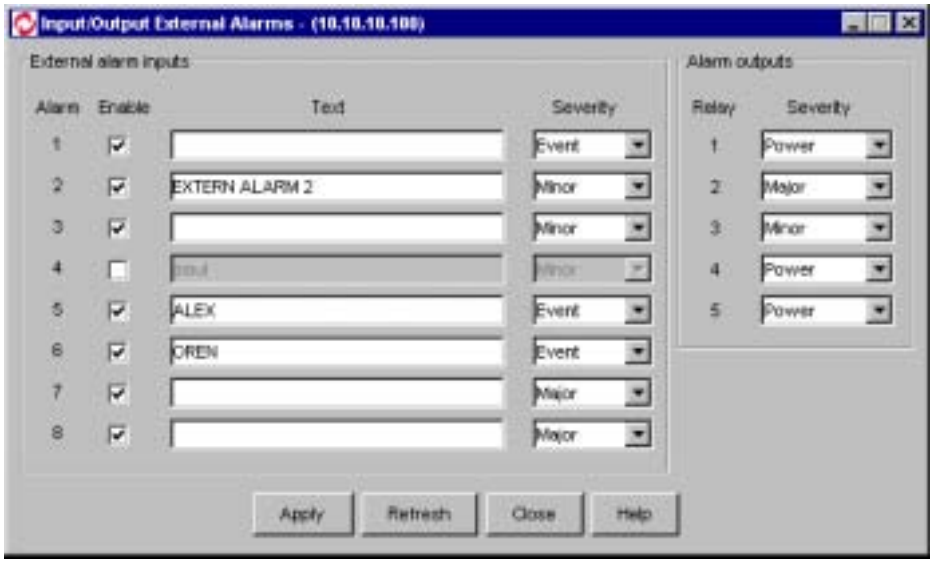


Figure 5-1 Input/Output External Alarms Window

   The microcontroller in the IDU reads alarm inputs (dry contact) and transmits them to the CeraView management system. This allows FibeAir to report external alarms that are not related to its own system.

   For each alarm on the left side of the window, do the following:

2. Click on the box next to the alarm number to enable/disable the alarm.
3. If you enable an alarm, enter a description of the alarm in the text field.
4. Select the alarm's severity level from the drop-down list (Major, Minor, Warning, or Event).
5. FibeAir provides five alarm outputs that can be used by other systems to sense FibeAir alarms. The outputs are configured on the right side of the window.

   The alarm outputs are Form C Relays. Each output relay provides three pins, as follows: Normally Open (NO), Normally Closed (NC), Common (C).

   Output alarms can be defined as Major, Minor, Warning, External, Power, Line, or Loopback.

   The default alarm output setting for all relays is "Power".

   The relays may be connected to customer-specific applications. Refer to Appendix B for details concerning the alarm connector pin assignments.

6. Click **Apply** to save the settings.
7. Click **Close**.

Auxiliary Channel

In the Auxiliary Channel window you can select an optional channel for additional data communication.

1. Select **Configuration, IDU, Auxiliary Channel**.

   The Auxiliary Channel Configuration window appears.

Figure 5-2 Auxiliary Channel Configuration Window

2. Select the User Channel (64 Kbps) if you will be using that channel.
3. Click **Apply** to save the settings.
4. Click **Close**.

Transport

The Transport Configuration window allows you to configure special transmission parameters. This is recommended for advanced users only.

1. Select **Configuration, IDU, Transport**, or click the Transport Configuration icon.

   The Transport Configuration window appears.

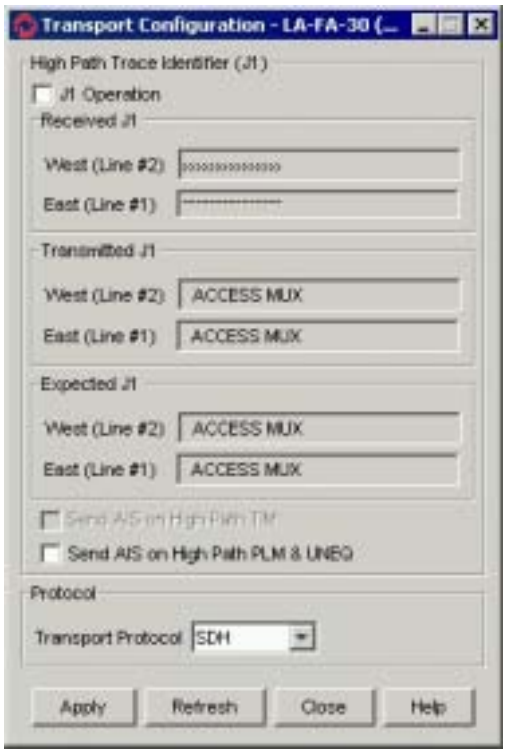


Figure 5-3 Transport Configuration Window

2. In the **High Path Trace Identifier (J1)** area, select **J1 Operation** to enable the identifier.

   J1 is used to continuously transmit a Path Access Point Identifier so that a path receiving terminal can verify its ongoing connection to the intended transmitter.

   Received J1 displays the identifier that is receieved for verification.

   For **Transmitted J1**, specify the West and East J1 identifier that will be transmitted to the receiver.

   For **Expected J1**, specify the identifier for West and East that you expect to receive.

   Select **Send AIS on High Path TIM** if you want Alarm Indication Signals to be sent in the event of TIM (Trace Identification Mismatch).

   Select **Send AIS on High Path PLM & UNEQ** if you want Alarm Indication Signals to be sent in the event of PLM (Path Label Mismatch) or UNEQ.

3. For **Protocol**, select the protocol your radio is using.
4. Click **Apply** to save the settings.
5. Click **Close**.

Explanation of TIM Events

SDH provides path trace capability on different levels, as follows:

Regenerator Section Trace - J0
J0 is used to continuously transmit a Section Access Point Identifier so that a section receiver can verify its ongoing connection to the intended transmitter.
In FibeAir, the J0 byte is used for **Link ID**.

Path Trace - J1
J1 is used to continuously transmit a Path Access Point Identifier so that a path receiving terminal can verify its ongoing connection to the intended transmitter.

Path Trace - J2
J2 is used to continuously transmit a Low Order Path Access Point Identifier so that a path receiving terminal can verify its ongoing connection to the intended transmitter.

J2 allows the user to verify VC-12 paths, which is useful as a means of checking radio/optical connections whenever changes are made. The path trace ID can be determined by the user for VC-12 trails in each direction (receive/transmit) separately. The user can also display the actual received pattern for maintenance purposes.

The incoming string is checked against the expected receive string. A discrepancy between the strings generates a TIM alarm or an AIS, depending on what you decide for Path TIM activation.

If the trail is protected and you selected the AIS option, a switch to the protection path will be performed in the event of TIM, since AIS is one of the criteria for switching to protection.

Explanation of PLM Events

The SDH path overhead includes signal label information that indicates the composition of the signal. For FibeAir1500A/1528A, the signal labels are automatically set according to the traffic on/off status, as defined in the table below. If the received signal label is not as expected, a PLM alarm is generated.

Signal Label Data

VC Level	Value	Traffic On	Traffic Off
VC-12 (bits 5-7 of V5)	Transmit Value	010 - asynchronous floating	000 - unequipped
	Expected Receive Value	010 - asynchronous floating or 001 - equipped non-specific	000 - unequipped
VC-3 (C2 byte)	Transmit Value	04_H - asynchronous mapping of 34/45 Mbit/s	00_H - unequipped
	Expected Receive Value	04_H - asynchronous mapping of 34/45 Mbit/s or 01_H - equipped non-specific	00_H - unequipped

Trail

The Trail Table maps the VCs (Virtual Containers) representing the E1 lines.

Using this table, you can set several parameters for each line, such as the path name and protected configuration.

1. Select **Configuration, IDU, Trail**, or click the Trail Configuration icon.

   The Trail Configuration window appears.

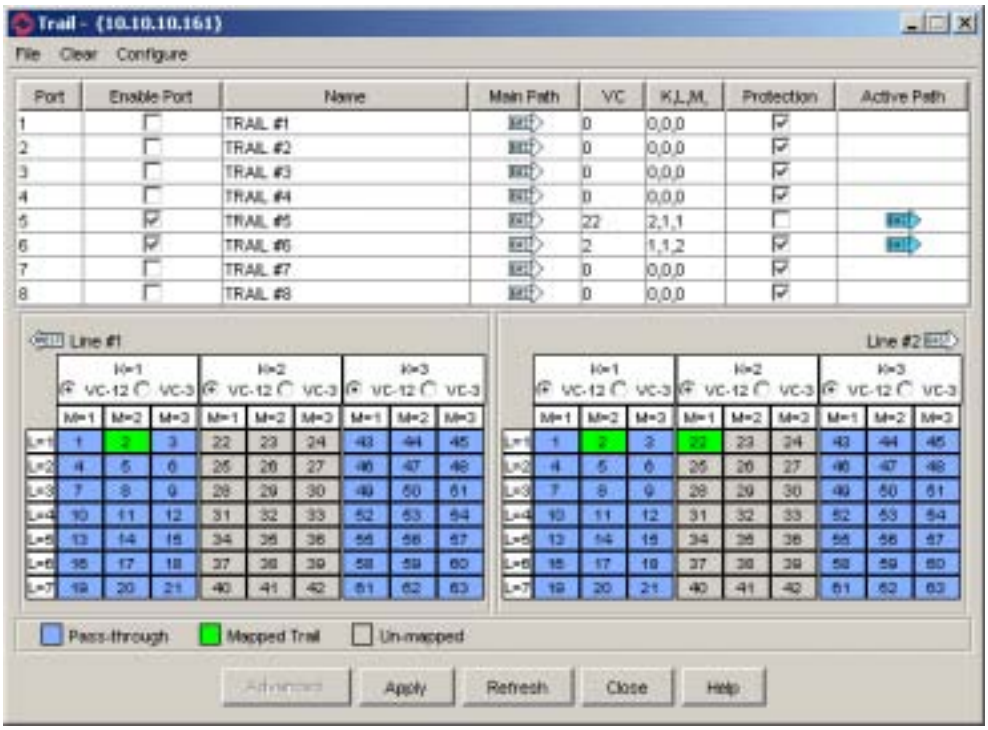


Figure 5-8 Trail Table Window

The table lists up to 8 E1 tributary lines. The VC map section of the table displays 63 VCs (entire STM-1 capacity) and the status of each, represented by different colors. Gray represents an unused VC, Green represents a VC used by an E1 trail, and blue represents a VC designated as *pass-through* (passes the relay frame as is).

Note that VC-3 trails can only be configured as *pass-through*.

2. For each trail, select or deselect the **Enable Port** box. Deselecting the box will block all traffic on that E1/T1 line.
3. In the **Name** column, click in the text box and enter the name you want for that E1/T1 line.
4. In the **Main Path** column, click in the box and select either east or west for the main path.
5. The **VC** and **K,L,M** columns are read-only. The values in those columns represent the Virtual Container mapping for the E1/T1 tributary lines.
6. In the **Protection** column, mark the box if you want the tributary line to run in Protected mode, whereby traffic will be delivered in both directions.
7. The **Active Path** column shows the current active path.
8. In the **West** and **East** sections of the window, select the payload type for each K number.
9. For each VC box, you can right-click the mouse to change the bi-directional connection of the line, as follows:

   Clear — No connection (the channel is not in use).

   No low order path (LP) alarms and TU alarms (TU-LOP and TU-AIS) will be reported, and no PM (Performance Monitoring) logs will be generated for the channel.

Map Trail	A tributary signal is connected to a specific channel (TU) in the STM-1 signal. For non-protected connections, the tributary is connected to one of the aggregate ports. For protected connections, the tributary is connected to two aggregate ports for path protection. Note that for protected connections, the same channel number must be used for the two aggregates.
Pass-Through	Matching channels are connected from one aggregate to the other.

10. Click **Apply** to save the changes.
11. Click **Close** to close the window.

Synchronization

Synchronization configuration enables you to set values for the network's clock synchronization.

1. Select **Configuration**, **IDU**, **Synchronization**., or click the **Clock** area in the CeraView main window FibeAir physical view.

   The Synchronization Configuration window appears.

Figure 5-9 Synchronization Configuration Window

2. The **Internal Clock Unit** area displays the current clock unit type, state, and status. The type can be ST-3E, ST-3, or Sec.

   The status can be **Unlocked**, which indicates that the clock source is not locked to the primary or secondary path, or **Out of Range**, which indicates that the unit cannot be synchronized with the external clock signal. When this occurs, an Out of Range alarm is generated.

3. To enable/disable the SSM mode, click the **SSM Mode** menu and select enable or disable.

   Note that if the SSM mode is not enabled, each network element will need to determine the clock quality on its own.

4. In the **Primary Clock Parameters** area, for **Source**, click the drop-down list and select the clock source, which can be one of the following:
   - Internal
   - External 2 MB
   - Line #1
   - Line #2
   - Fiber
   - External 2 MHz
   - Tributary # (1-8)
5. The **Quality** parameter is used to set the quality level of the clock signal. Click the drop-down list and select the level, which can be one of the following:
   - PRC
   - SSUT
   - SSUL
   - SEC
   - STU
   - DNU
6. Repeat steps 4 and 5 for the **Secondary Clock Parameters** area.
7. Select **Clock Output Mute** if you do not want the internal clock to be used to synchronize other network elements.
8. Click **Apply** to save the settings.
9. Click **Close** to close the window.

Line #1 Direction

Used this option to set the direction for Line #1.

1. Select **Configuration**, **IDU**, **Line #1 Direction**.

   The Line #1 Direction window appears.

Figure 5-10 Line #1 Direction Configuration Window

2. Choose the direction you want for the line and click **Apply**.

Interfaces

STM1

1. Select **Configuration, Interfaces**, **STM1**, or click the **STM1** area in the physical view of the CeraView main window.

   The STM1 Configuration window appears.

Figure 5-11 STM1 Interface Configuration Window

2. In the **STM1 #** field, select **Enabled** to activate the interface.
3. In the **Excessive Error** field, select the level above which an Excessive BER alarm is issued for errors detected over the radio link.
4. In the **Signal Degrade** field, select the level above which a Signal Degrade alarm is issued for errors detected over the radio link.
5. The **BER** field is read-only and shows the above which a BER alarm is issued for errors detected over the radio link.
6. In the **Trace Identifier** area, select **J0 Operation** to use the J0 byte as a trace identifier in the SDH RSOH.

   If you activate J0, use the **Transmitted J0** and **Expected J0** fields to define the IDU identifier string.
7. Click **Apply** to save the settings.
8. Click **Close**.

E1

1. Select **Configuration, Interfaces**, **E1**, or click the **8xE1** area in the CeraView main window FibeAir physical view.

   The E1 Ports Configuration window appears.

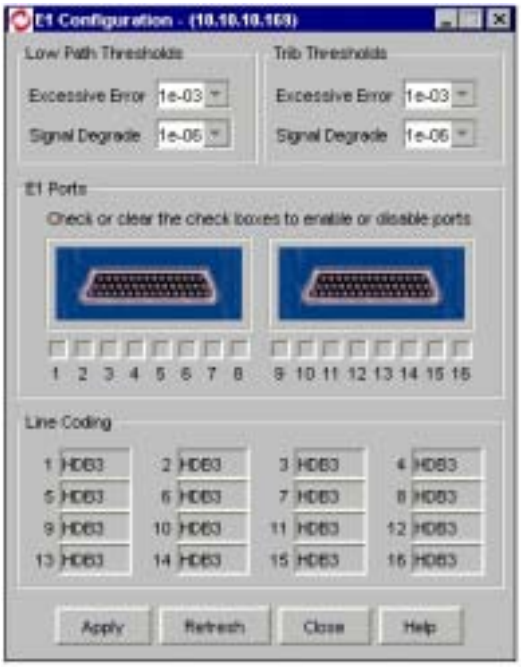


Figure 5-12 E1 Ports Configuration Window

2. In the For **Low Path Thresholds** and **Trib Thresholds** areas, click the drop-down lists and select the values which if exceeded will cause appropriate alarms to be generated.
3. In the **E1 Ports** area, select or deselect the boxes to enable or disable the ports.

   Note: You can enable/disable only ports that were mapped.
4. The **Line Coding** area shows the coding method used for each E1 line.
5. Click **Apply** to save the settings.
6. Click **Close** to close the window.

Management System

IP Configuration

1. Select **Configuration**, **Management System**, **IP Configuration**.

   The IP Configuration window appears.

Figure 5-13 IP Configuration Window

2. In the **Ethernet Addresses** area, specify the **Ethernet IP Mask** and **Default Router IP Address**.
3. In the **Serial NMS** area, specify the **IP Mask**, **Baud Rate**, and **Modem Phone Number**.
4. Click **Apply** to save the changes.
5. Click **Close**.

Trap Forwarding

1. Select **Configuration**, **Management System**, **Trap Forwarding**, or click the Trap Forwarding icon.

   The Trap Forwarding Configuration window appears.

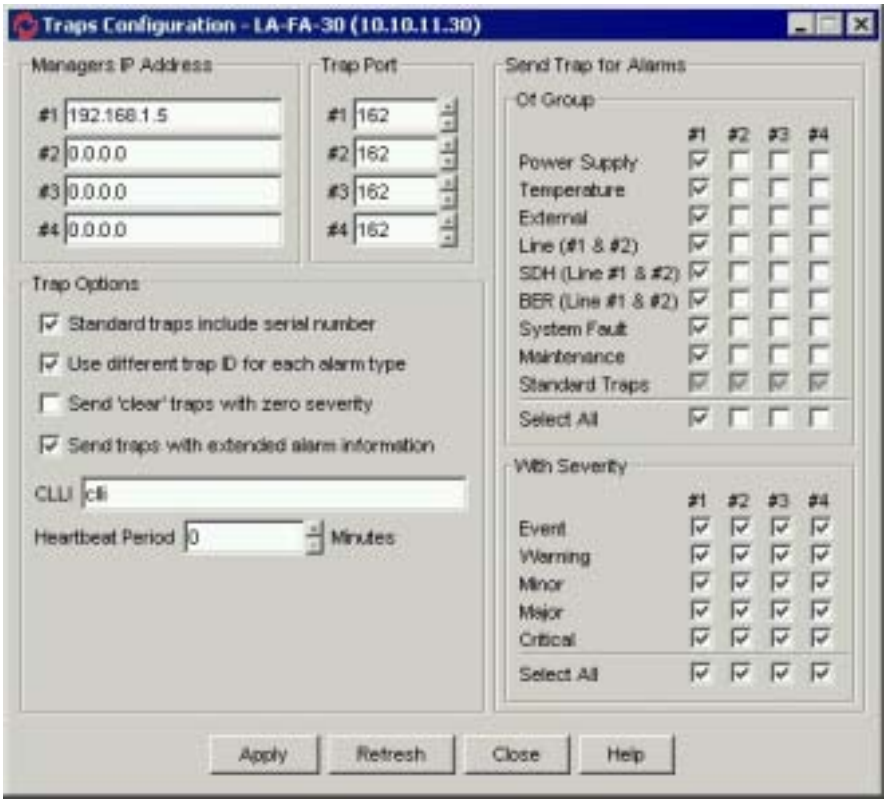


Figure 5-14 Trap Forwarding Configuration Window

2. In the **Managers IP Address** area, specify the IP addresses of the managers to which you want traps to be sent. For each manager IP you specify, specify the **Trap Port**.
3. In the **Send Trap for Alarms of Group** section, you determine which alarms will be sent as SNMP traps to each manager. In each manager column, select the alarm types you want to include for that manager.
4. For **Send Trap for Alarms with Severity**, select the severity filter to determine which types of alarms will be forwarded.
5. In the **Trap Options** area, select **Standard traps include serial number** if you want trap messages to include the IDU serial number.

   Select **Use different ID for each alarm type** if you want each type of alarm to receive a unique ID.

   Select **Send 'clear' traps with zero severity** if you want to receive information concerning "clear" traps.

   Select **Send traps with extended alarm information** if you want the Alarm ID, origin, and unit from the current alarm table to be added to the end of each FibeAir-related trap.
6. For **CLLI** (Common Language Location Identifier), enter up to 18 characters that will represent your system ID when traps are sent.

7. For **Heartbeat Period**, a heartbeat signal will be generated every x minutes (the number you enter) to tell your system that the trap meachnism is working.
8. Click **Apply** to save the settings.
9. Click **Close**.

NTP Configuration

NTP (Network Time Protocol) configuration is performed when an NTP server is used to synchronize network activity.

1. Select **Configuration**, **Management System**, **NTP**.

   The NTP Configuration window appears.

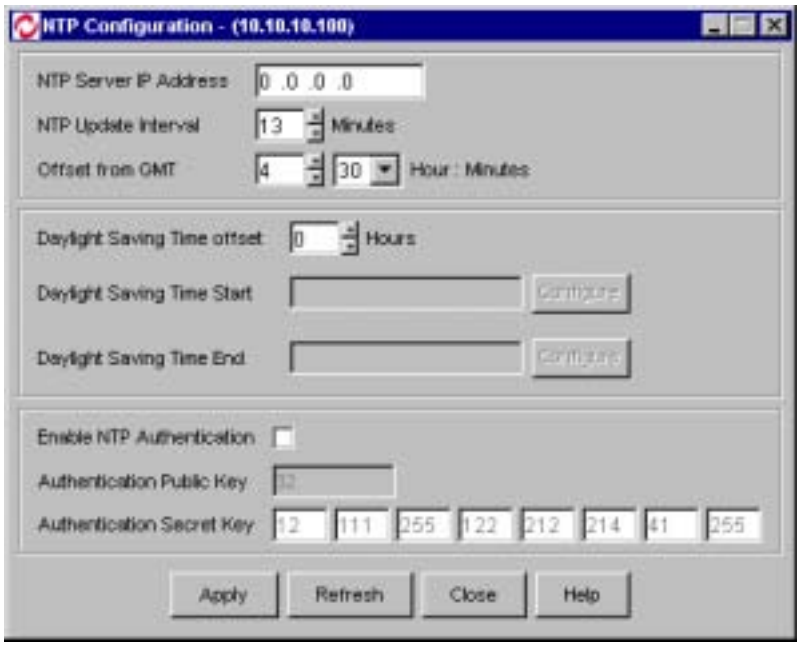


Figure 5-15 NTP Configuration Window

2. Enter the IP of the NTP server.
3. For **NTP Update Interval**, use the up/down arrows to select the amount of time (minutes) between synchronization updates.
4. For **Offset from GMT**, use the arrow buttons and the drop-down list to select the amount of time required to compensate for offset from the GMT (Greenwich Mean Time).
5. For **Daylight Saving Time Offset**, click the arrow buttons to set the amount of time required to compensate for daylight saving.
6. For **Daylight Saving Time Start**, click **Configure** to set the beginning of the daylight saving time period.
7. For **Daylight Saving Time End**, click **Configure** to set the end of the daylight saving time period.
8. Select **Enable NTP Authentication** for secure access to the NTP server.

   If you enable NTP, enter the **Authentication Public Key**, and the **Authentication Secret Key** numbers.

9. Click **Apply** to save the settings.
10. Click **Close**.

In-band Configuration

In-band configuration is performed when you want to work with In-band Management. In-band Management refers to a method whereby the network management software sends management packets through the same network it is managing. This differs from out-of-band management in which the network management software uses a different network (overlay network) in order to communicate with the managed elements.

1. Select **Configuration**, **Management System**, **In-band**.

   The In-band Configuration window appears.

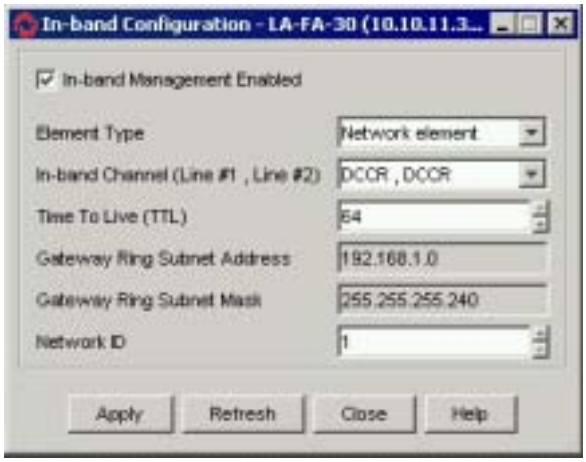


Figure 5-16 In-band Configuration Window

2. Select **In-band Management Enabled** to activate In-band management.
3. For **Element Type**, click the drop-down list and select the desired element (Network Element or Gateway).
4. For **In-band Channel**, click the drop-down list and select the channel you want to use.
5. For **Time To Live (TTL)**, use the up/down arrows to select the desired value.
6. The **Gateway Ring Subnet Address** and **Gateway Ring Subnet Mask** fields are read-only.
7. For **Network ID**, use the arrow buttons to select the desired value.
8. Click **Apply** to save the settings.
9. Click **Close** to close the window.

Alarms Menu

Current Alarms

1. Select **Alarms**, **Current Alarms**, or click the Current Alarms icon.

   The Current Alarms window appears.

Figure 5-17 Current Alarms Window

Each line in the window describes a different alarm.

The color in the **Severity** column indicates the severity of the alarm, as shown at the bottom of the alarm list.

The source of the alarm appears in the **Unit** column.

The **Direction** column indicates the transmission direction of the unit that generated the alarm.

The **Description** column provides information about the alarm.

In addition to the current alarms, the current IDU temperature is shown at the bottom of the window.

Alarm Log

1. Select **Alarms**, **Alarm Log**, or click the Alarm Log icon.

   The Alarm Log window appears.

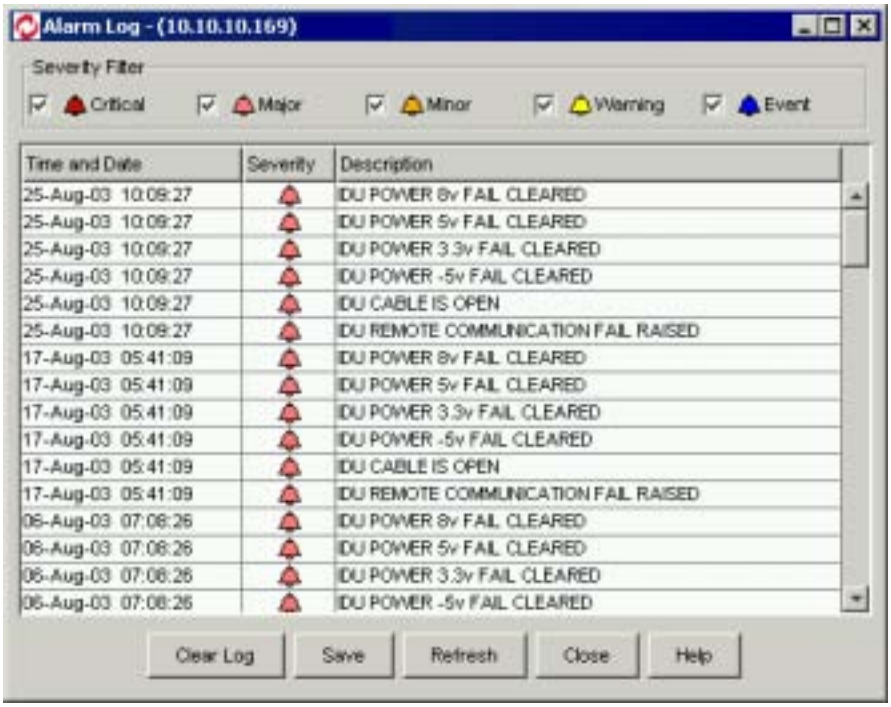

Alarm Log - (10.10.10.169)
Severity Filter
Critical
Major
Minor
Warning
Event
Time and Date
Severity
Description
25-Aug-03 10:09:27 IDU POWER 8v FAIL CLEARED
25-Aug-03 10:09:27 IDU POWER 5v FAIL CLEARED
25-Aug-03 10:09:27 IDU POWER 3.3v FAIL CLEARED
25-Aug-03 10:09:27 IDU POWER -5v FAIL CLEARED
25-Aug-03 10:09:27 IDU CABLE IS OPEN
25-Aug-03 10:09:27 IDU REMOTE COMMUNICATION FAIL RAISED
17-Aug-03 05:41:09 IDU POWER 8v FAIL CLEARED
17-Aug-03 05:41:09 IDU POWER 5v FAIL CLEARED
17-Aug-03 05:41:09 IDU POWER 3.3v FAIL CLEARED
17-Aug-03 05:41:09 IDU POWER -5v FAIL CLEARED
17-Aug-03 05:41:09 IDU CABLE IS OPEN
17-Aug-03 05:41:09 IDU REMOTE COMMUNICATION FAIL RAISED
06-Aug-03 07:08:26 IDU POWER 8v FAIL CLEARED
06-Aug-03 07:08:26 IDU POWER 5v FAIL CLEARED
06-Aug-03 07:08:26 IDU POWER 3.3v FAIL CLEARED
06-Aug-03 07:08:26 IDU POWER -5v FAIL CLEARED
Clear Log
Save
Refresh
Close
Help

Figure 5-18 Alarm Log Window

The Alarm Log window displays the following information:

Time - The time the alarm was triggered.

Date - The date the alarm was triggered.

Severity - The severity of the alarm. You can determine which severity levels will be displayed in the window by selecting the levels at the top of the window.

Description - A description of the alarm, and its status (RAISED, CLEARED).

To clear the log file, click **Clear Log**.

To save the log report in the window, click **Save**.

To close the window, click **Close**.

Save Alarms to File

To save alarms in the alarm log to a file, and continuously log alarms generated by the unit in the same file, select **Alarms**, **Start Saving Log**.

In the Choose Alarm Log File window that appears, specify the file in which you want to save the alarms, and click **Save**.

Existing alarms in the log are saved in the file you specified, and new alarms are added to the file until you select **Stop Saving Log** or exit the application.

Performance Menu

Line

The Line Performance Monitoring window displays the number of line UAS (unavailable seconds), measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Line**, **Line #1/Line#2**.

   The Line Monitoring graphic window appears.

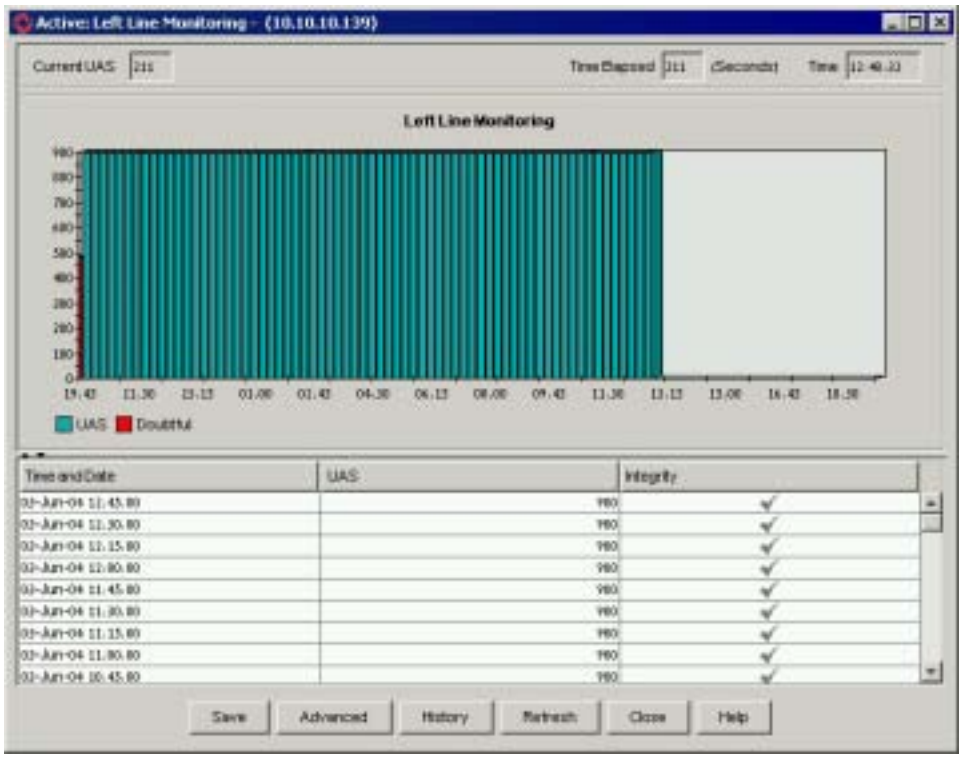


Figure 5-19 Line Monitoring Graphic Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

The monitoring table displays UAS values over the last 24 hours. The values are the same as those that appear in the graph, only in table format.

The Integrity column indicates whether or not the values received at that time and date are reliable. A red x icon in the column indicates that the values are not reliable due to a possible power surge or power failure event that occurred at that time. (This column corresponds to the Doubtful indication in the graphic window.)

2. To view historical UAS values, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

Tributaries

The Tributaries Performance Monitoring window displays the UAS (number of Unavailable Seconds per interval) measured every 15 minutes over the last 24 hours, on the E1/T1 interface.

1. Select **Performance**, **Tributaries, E1 #**.

   The Tributary Monitoring graphic window appears.

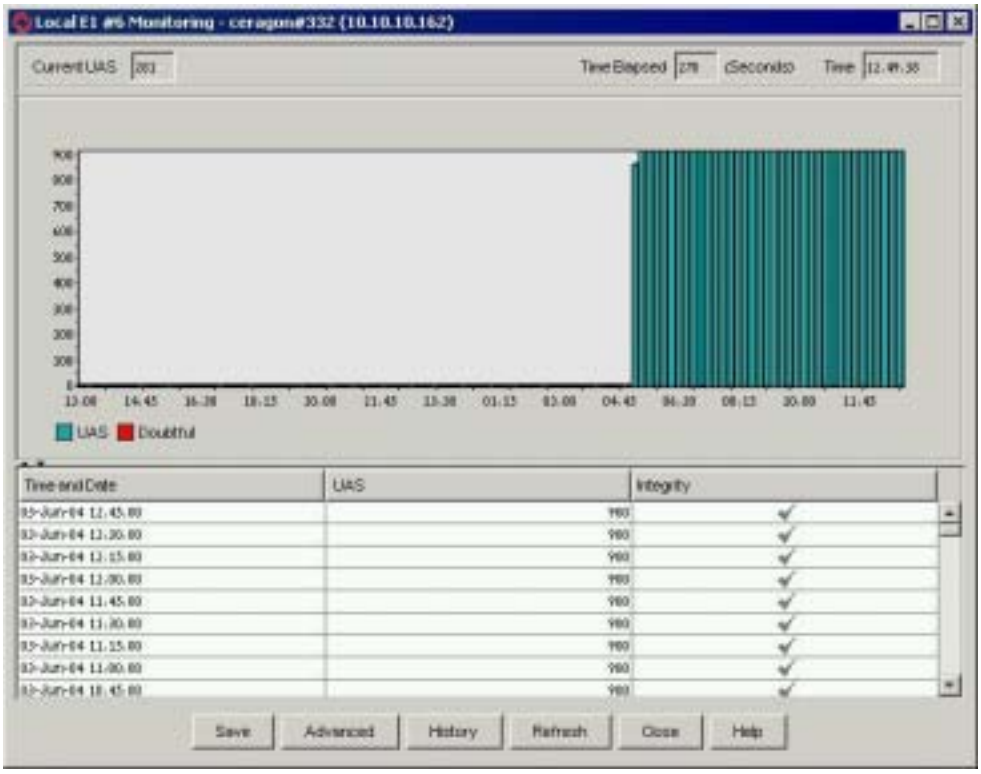


Figure 5-20 Tributary Monitoring Graphic Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

Doubtful values are values that were not generated during normal system operation. For example, the values may have been generated during a system reset or failure.

The format of the UAS monitoring table is similar to the Line UAS table described above.

2. To view historical UAS values, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

Trail

The Trail Performance Monitoring window displays trail signal levels measured every 15 minutes over the last 24 hours.

1. Select **Performance**, **Trail**, ***Trail Number, East/West***.

   The Trail Monitoring graphic window appears.

Figure 5-21 Trail Monitoring Graphic Window

Time Elapsed is the current interval in seconds. The value can be between 0 and 900 (15 minutes).

UAS is the Un-Available Seconds value of the current interval. The value can be between 0 and 900 seconds (15 minutes).

The format of the UAS monitoring table is similar to the Line UAS table described above.

2. To view historical UAS values, click **History**. The values shown in the window that appears are values that were received over the last 30 days.

Maintenance

Loopback

1. Select **Maintenance**, **Loopback,** or click the Loopback icon.

   The Loopback window appears.

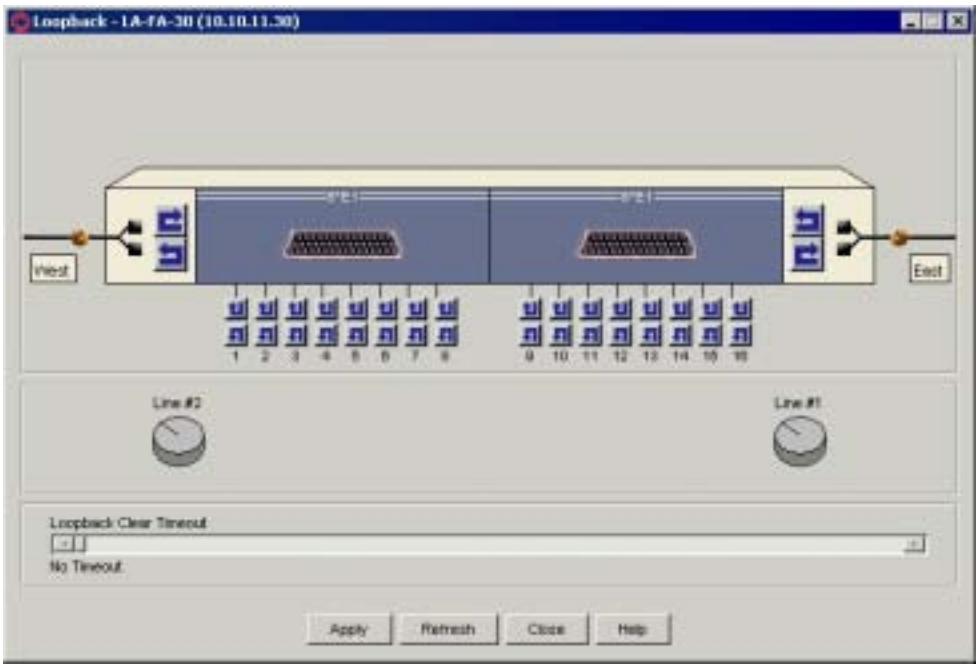


Figure 5-22 Loopback Window

2. Click the upper button on the west side to select an external radio loopback test.

   Click the lower button on the west side to select an internal radio loopback test.

   Click the upper button on the east side to select an external line loopback test.

   Click the lower button on the east side to select an internal line loopback test.

   Click the upper button in the trail list to select an external trail loopback test.

   Click the lower button in the trail list to select an internal trail loopback test.

3. Set the **LoopBack Clear Timeout** scale to the amount of time you want the test to run.

   When a radio or line loopback test is running, a pie display to the right of the timeout scale shows how much time is left for the test.

4. Click **Apply** to run the test.

5. When you are done with loopback testing, click **Close** to close the window.

Note that closing the window will not stop the loopback test. To stop a test, unmark it by clicking on the relevant arrow button, and then click Apply.

Software Reset

Select **Maintenance**, **Software Reset** to reset the IDU agent software for maintenance purposes.

Clear PM

Select this item to clear the Performance Monitoring log files.

Protection

1+1 Protection

1. Select **Protection**, **1+1 Protection**, **Protection Configuration** to configure the radio protection switch mechanism.

   The Radio Protection configuration window appears.

Figure 5-23 Radio Protection Configuration Window

2. In the **Protection Switch Criteria** area, select the criteria for which you want protection switching to occur.
3. For **Line Output**, select either **Single** or **Dual**.
4. Click **Apply** to save the changes.
5. Click **Close** to close the window.

Copy Configuration

Select **Protection**, **1+1 Protection**, **Commands**, **Copy Configuration to Mate** to copy the configuration of one unit to the other.

After you select this option, click **Yes** in the confirmation message to copy the configuration.

Request Switch

Select **Protection**, **1+1 Protection**, **Commands**, **Request Switch** if you want to request a switch between the active and standby units.

After you select this option, click **Yes** in the confirmation message to copy the configuration.

Trail Protection

1. Select **Protection**, **Trail** to activate the protected path mechanism for the desired ports.

   The Trail Protection window appears.

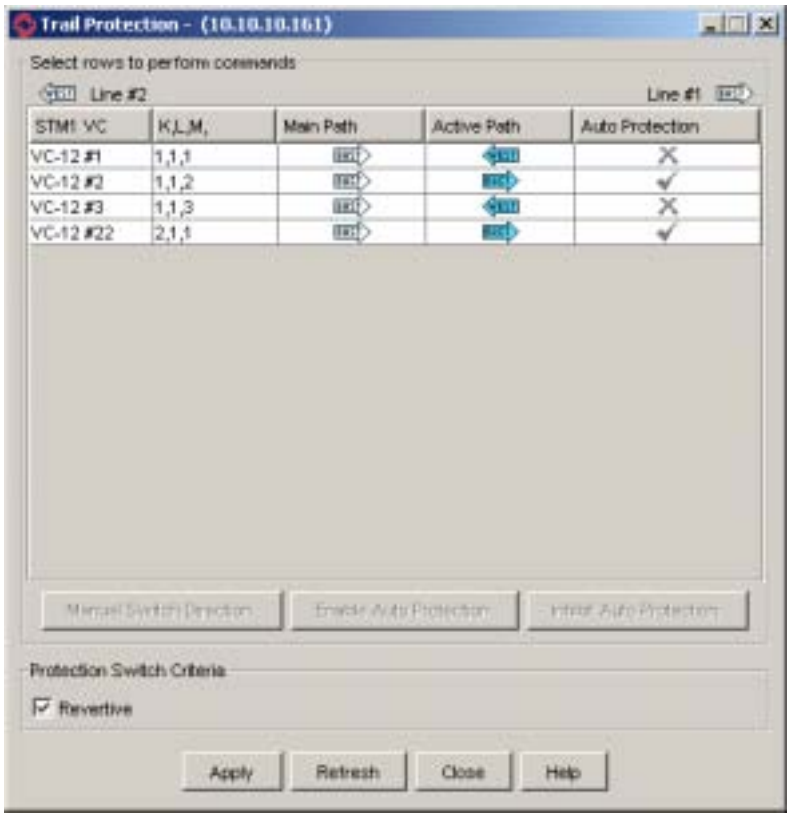


Figure 5-24 Trail Protection Window

2. In the **Trail List** area, select a row, and click **Manual Switch Direction** if you want to switch the traffic direction of the active path. This is a one-time operation that will be cleared after the current trail configuration session ends.

   Select **Enable Auto Protection** if you want the system to automatically switch the traffic direction upon detection of a fault in the current active path.

   To deactivate Auto Protection, select the relevant row, and click **Inhibit Auto Protection**.

   Note: To select more than one row in the trail list, hold down the **Ctrl** key on the keyboard.

3. Select **Revertive** if you want normal traffic on the protection path to be switched back to the original path after it is recovered from a fault.

   Revertive mode may be required to support specific services, whereby the shortest physical route offers better performance. For example, for synchronization of another network using protected E1. The main path will generally be shorter, and the protection path will be longer.

   If you don't select Revertive, no switching to the original fault-cleared path will be performed to prevent unnecessary traffic hits and management event reports.

4. Click **Apply** to save the settings.

5. Click **Close**.

Chapter 6
Troubleshooting

General

Ceragon designed FibeAir to be highly reliable and relatively maintenance free. In the event of a system failure, the system will provide detailed indications to assist troubleshooting and fault isolation.

This chapter explains the alarm indications of the FibeAir system, and contains procedures for troubleshooting and fault isolation.

Maintenance Policy

To ensure simple and efficient system maintenance, the on-site technician will only replace IDU or ODU modules, and not repair them. Under no circumstance will the technician be permitted to open the equipment in order to repair a module or circuit board. Opening equipment will terminate the Ceragon warranty.

Maintenance procedures the technician can perform include visual inspection, cleaning, cable/connector repair, link alignment/adjustment, and retorquing antenna mount bolts.

Visual Inspection

The following table lists the suggested preventive maintenance procedures, which include visual inspection of the equipment and verification of operational parameters.

It is recommended to perform the procedures as often as local environmental conditions require. It is recommended to notify the end customer prior to performing any preventive maintenance procedures that could affect service on the circuit.

What to check	*Check for ...*	*Comments*
IDU alarm LEDs	All Green	If not, perform troubleshooting
Coax cable connection	Tight, no corrosion or moisture	Clean/repair as required
Coax cable	No cracks or kinks	Replace as required
All equipment	Dust or dirt	Clean as required
Receive level (voltage in IDU/ODU, or using management)	Per installation records	Align/adjust as required
Torque on antenna mount bolts	Tight mount	Adjust as required

Troubleshooting

Troubleshooting Steps

Corrective maintenance consists of the steps described in the following sections. The steps provide a logical, sequential method for diagnosing and resolving system problems.

Step 1: Define the Symptom

This step is generally peformed by the customer's field technician or supervisor. Examples of symptoms include “IDU alarm is red”, “complete loss of service”, and “excessive errors”.

Symptoms may be constant or intermittent. Constant symptoms require immediate troubleshooting attention. Intermittent symptoms may require circuit monitoring or robust test procedures prior to troubleshooting.

Step 2: Isolate the Problem

After you have a clear definition of the symptom, the malfunction can be isolated using diagnostics, loopback testing, fault isolation tables/flow charts, test equipment, and manual procedures.

This step will identify the specific piece of equipment that is failing.

Although it may be difficult at times to immediately determine which part of a radio link is causing the fault, the initial suspicion should be focused on one of the following near-end or far-end issues:

Power supplies

Fading (due to heavy rain, new obstacle in path, antenna misalignment)

External equipment (SONET/SDH, ATM, FastEthernet, etc.)

Indoor Unit (IDU)

Outdoor Unit (ODU)

RF cable between the ODU and IDU

Exposure of equipment to severe conditions (high temperature, etc.)

System configuration

Step 3: Understand the Problem

Once the fault has been isolated, you will need to understand why the fault occurred and what is required to correct it. Use the tables provided in the following sections to understand the problem, and for suggestions of possible solutions.

Step 4: Solve the Problem

You can use the troubleshooting information in this chapter to help solve the problem.

IDU LED Indicators

The following table lists the LEDs on the IDU panel and their functions.

LED	Color			Description
	Red	Yellow	Green	
PWR (Power)	X		X	**Red** - power supply problem
LINE	X	X	X	**Red** - no input to main channel / high BER **Yellow** - JO mismatch
LOF (Loss of Frame)	X		X	**Red** - radio did not recognize information frame (radio link problem/radio LOF)
BER (Bit Error Ratio)	X	X	X	**Red** - radio BER higher than radio excessive error threshold definition (see Sonet/SDH configuration window) **Yellow** - radio BER higher than radio signal degrade threshold definition (see Sonet/SDH configuration window)
LPBK (Loopback)	X		X	**Red** - loopback is active
STBY (Standby)		X	X	**Yellow** - Protected configuration. The unit is currently passive or Tx mute is operating
IDU	X	X	X	**Red** - modem unlocked **Yellow** - high temperature / fan problem
ODU	X	X	X	**Red** - no link / ODU power / ODU unlocked **Yellow** - radio interference / high temperature / Rx/Tx out of range
CBL (Cable)	X		X	**Red** - RF cable open / RF cable short
RMT (Remote Unit)	X	X	X	**Red** - no link / remote unit problem (red LED is lit in the remote unit) **Yellow** - warning in remote unit (yellow LED is lit in the remote unit)

LED Indications for Hitless Systems

For Hitless systems the following table lists the LEDs and their indications:

LOF (LED Panel) - LOF

LED Color	Alarm Explanation
Yellow	Local unit receives LOF from a receive path currently *not* in use.
Red	Local unit receives LOF from a receive path currently in use.

LOF (Interface Panel) - ALRM

LED Color	Alarm Explanation
OFF	Hitless mode is disabled.
Red	Local unit receives LOF from the mate unit.
Green	Hitless switching can be performed, if necessary.

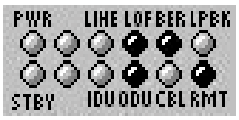
Local Receiver (Interface Panel) - Rx ACTV

LED Color	Alarm Explanation
OFF	Local receiver not in use.
Green	Local receiver in use.

General Troubleshooting Guide

The following table lists general system faults, related alarms, possible causes, and troubleshooting procedures.

Condition	Alarm Indication	Probable Cause	Corrective Action
IDU / Line			
IDU Power Supply Failure	PWR LED Red	One or more voltages in the IDU power supply are not correct	Replace IDU
Local IDU Failure	IDU LED **Red** - modulator failure **Yellow** - high temperature or cooling fan	Modulator failure High temperature Cooling fan	Check alarms. If *Modulator fail*, replace IDU Check air conditioning in facility Check alarms. If *High Temp*, check alarm log file for *FAN failure*. If it exists, replace IDU
Problem with line input (from external equipment)	LINE LED **Red** - loss of signal from line side, loss of frame, BER **Yellow** - signal degraded, J0 mismatch	External equipment Physical connection	Refer to Interface Troubleshooting procedures later in this chapter

Condition	Alarm Indication	Probable Cause	Corrective Action
ODU / Radio			
ODU Problem	ODU LED: **Red** - ODU power failure **Yellow** - Tx/Rx out of range, temperature The Yellow condition will usually include indications by the RMT, LOF, and BER LEDs, as shown in the following figure. 		1 - Check RSL level at the remote terminal. Compare it to the calculated unfaded Rx level. If there is a change of more than 3 dB in the Rx level, change the Tx power level in the Local ODU Configuration window. 2 - Check if the ODU is operating in extreme temperature conditions. Such conditions may cause a variation of the Tx output power level.
Cable Short or Open	CBL LED **Red** This stauts of this LED is refreshed every minute	Cable Short Cable Open	Check cable connection
Remote Unit warning/failure	RMT LED Color is same as most severe LED indications in the remote unit. **Red** - may also indicate a disconnected link		Check alarms and see if there is a connectivity problem. If a connectivity alarm exists, check remote unit alarms.
General			
Standby Mode (Protection Configuration)	STBY LED	The STBY LED illuminates to indicate that the link is operating in Protected Configuration mode, but is currently not transmitting	None - normal operation

IDU Loopback	LPBK LED LPBK + RMT LEDs	The LPBK LED illuminates when loopback is run for testing purposes. If loopback is run on the remote unit, both LPBK and RMT will illuminate.	You can cancel loopback in the Loopback window, or by turning the system off and on.

Interface Troubleshooting Guide

This section provides solutions to problems caused by input interface equipment. If, after radio link is installed, the payload is not received, there may be a problem either with the line interface connection to FibeAir, or with external equipment. In such cases, the table in this section may assist in determining the problem.

Prior to performing line interface troubleshooting, check the following items, which are common causes of line interface failures:

External equipment Tx is connected to FibeAir Rx.

External equipment Rx is connected to FibeAir Tx.

Both external equipment and FibeAir are using the same interface (single mode, multi-mode).

For multi-mode interfaces, check that you are using multi-mode fibers to connect the unit. For The single mode interfaces, check that you are using single mode fibers.

If no problem is detected with any of the items above, proceed with the following line interface troubleshooting table.

Symptom	Probable Cause	Corrective Measures
LINE LED is red, and SIG LED on Main Channel Interface is off	1. No input signal	Check that both ends of the Main Channel fiber or electrical cable are properly connected, and that the source of the 155 Mb/s stream is on, enabled, and operating.
	2. Incorrect input signal format	Verify that the input signal is a valid 155.52 Mb/s signal, with framing.
	3. Tx/Rx cables swapped	Verify that the line input stream to the FibeAir unit is connected to the Rx connector. If necessary, swap Rx and Tx cables.
	4. Incorrect optical power levels or wavelength	For optical interfaces: 1. Verify that the optical source, optical cables, connectors, and attenuators are compatible with the interface type. Typical problems: single-mode cables are used with multi-mode physical interface, 850 nm or 1550 nm optical sources are connected to a 1300 nm interface. 2. Verify that the optical input power levels are within the allowed range (use an optical power level meter if necessary). For multi-mode interface, the input optical power level must be within -14 dBm and -31 dBm. For single-mode interface, the input optical power level must be within -2 dBm and -32 dBm.
LINE LED is red, and SIG LED on Main Channel Interface is on	1. Line LOF (Loss of Frame)	Verify that the input signal is a valid 155.52 Mb/s signal, with framing.
	2. Line EXC (excessive BER)	1. Verify that the source of the 155.52 Mb/s signal does not generate errors on the B1 byte (e.g. for maintenance/testing purposes) 2. Verify that the connectors are connected properly, cable ends are in good condition, and that no excessive stress is applied to the cables, cable ends, and connectors (bent optical cables may cause communication failures). 3. Check the input 155.52 Mb/s line for cables in poor condition, cables that are too long, etc. For optical lines, verify that the optical input power level is within the allowed range (provided in step 1 of the previous troubleshooting procedure).

Symptom	Probable Cause	Corrective Measures
LINE LED illuminates yellow	1. Line SD (Signal Degrade)	Same as for EXC (described in step 2 of the previous troubleshooting procedure).
	2. J0 mismatch alarm	Verify that the input stream is connected to the correct FibeAir unit. (Check that there are no errors in the routing or connections of your 155.52 Mb/s streams.) *-or-* Change the J0 trace message, in the equipment transmitting to the FibeAir unit, to the J0 trace message expected by the unit. *-or-* Change the FibeAir expected J0 trace message to match its received trace message. *-or-* Disable the Section Trace function of the FibeAir unit (set J0 Operation to Passthrough in the SDH/SONET Configuration window).
LINE and SIG LEDs are green, but equipment connected to FibeAir is malfunctioning	1. Interoperability problem	Try bypassing the FibeAir unit or running the loopbacks to locate the source of the problem. *-or-* Try disabling the FibeAir SONET/SDH features (set Operation to Passthrough mode in the SDH/SONET Configuration window). *-or-* Consult the documentation provided with the other equipment.
	2. The fault may be caused by the other equipment	Try bypassing the FibeAir unit or running the loopbacks to locate the source of the problem. *-or-* Consult the documentation provided with the other equipment.

Fault Isolation Using Loopbacks

The loopback function provides a means of testing the link at various points. During the procedure, the external equipment sends a data pattern and monitors its receipt. If the received pattern is identical to the sent pattern, the connection between the equipment and the loop is confirmed.

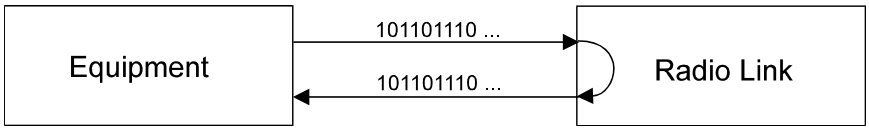


Figure 6-1 Loopback

FibeAir is capable of performing loopback testing at several points in the link. The test is run from the CeraView management software, or via the SNMP protocol.

During the loopback test, an alarm indication will appear to remind you to cancel the test when you are done.

The following loopback tests can be performed from the window:

Local:

155 MB/s Line Interface

Wayside Channel

64 KB/s User Channel

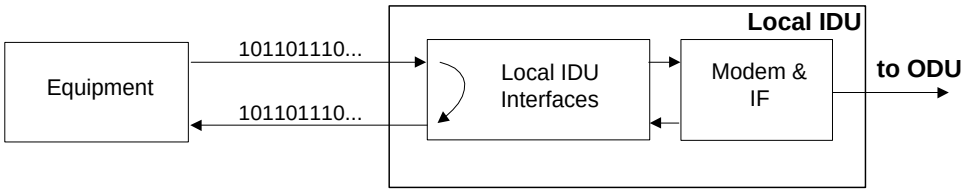


Figure 6-2 Local Loop

Full IDU (all three inputs through the IDU, modulator, and looped in the IF).

Remote:

155 MB/s Line Interface

Wayside Channel

64 KB/s User Channel

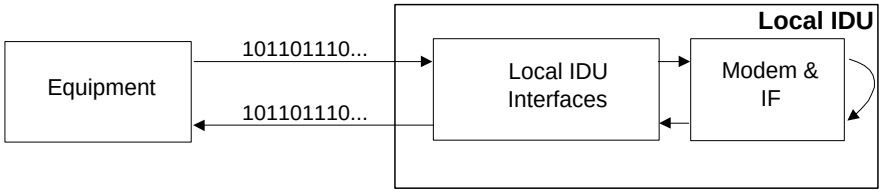


Figure 6-3 Remote Loop

Full Radio Link Loopback (local external equipment through the radio link, to the remote line interface module, back through the radio link, to the local external equipment).

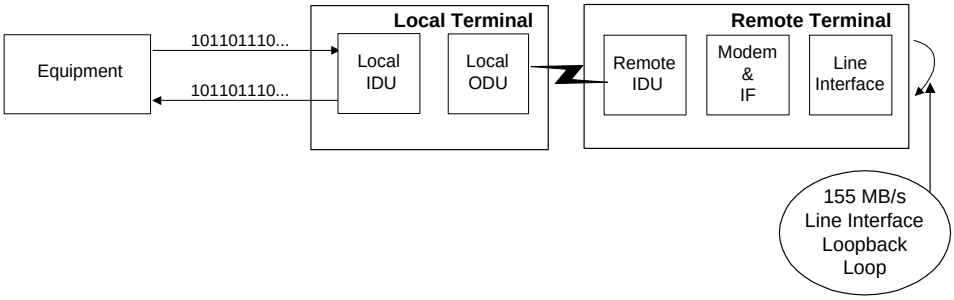


Figure 6-4 Remote Terminal Loop

Connection Configuration Troubleshooting Guide

Problems that occur when trying to connect to the FibeAir system using CeraView, may be due to incorrect cable configuration. If there is a connection problem in the system, CeraView will start, but an hour glass will appear when the software is loading to indicate that a problem exists.

The following steps will help you identify and correct such problems.

Check the Cables

Refer to the figure below for the following procedures.

1. For Ethernet connection between FibeAir and a PC network card, use a cross cable.

   For Ethernet connection between FibeAir and an Ethernet hub (for example, connecting to a LAN jack in a wall) use a straight cable.

2. For serial connection between FibeAir and a PC serial port, use a straight cable.

   For serial connection using a dial-up modem, use a cross cable.

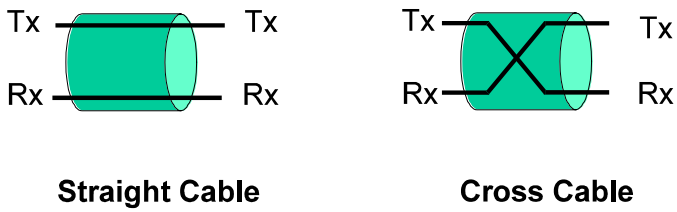


Figure 6-5 Cable Connections

Check Read and Write Communities

1. Ping FibeAir.

   If ping succeeds, the problem may be with the CeraView software installation, or the computer TCP\IP stack. Check the read and write communities in FibeAir and in the management station configuration.

   If ping fails, there may be a network connectivity problem.

   A typical conflict may occur between the IDU configuration shown in the terminal window below, and the related CeraView parameter.

   According to the example below, the user needs to enter “netman” in the **Write Community** field.

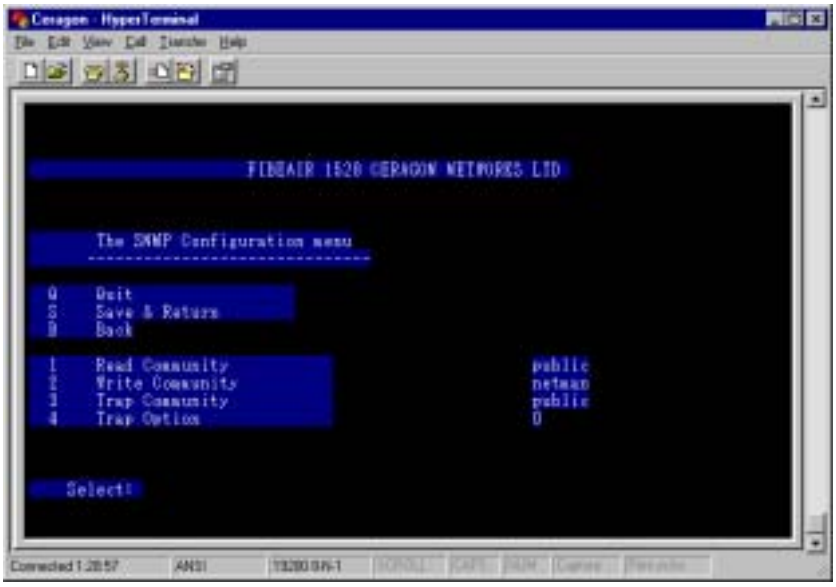


Figure 6-6 Typical Configuration Conflict

In addition, the Agent Address must be identical to the IDU IP address, and the source address must be identical to the computer's address.

The following figure shows a typical example of IP addresses and network configuration.

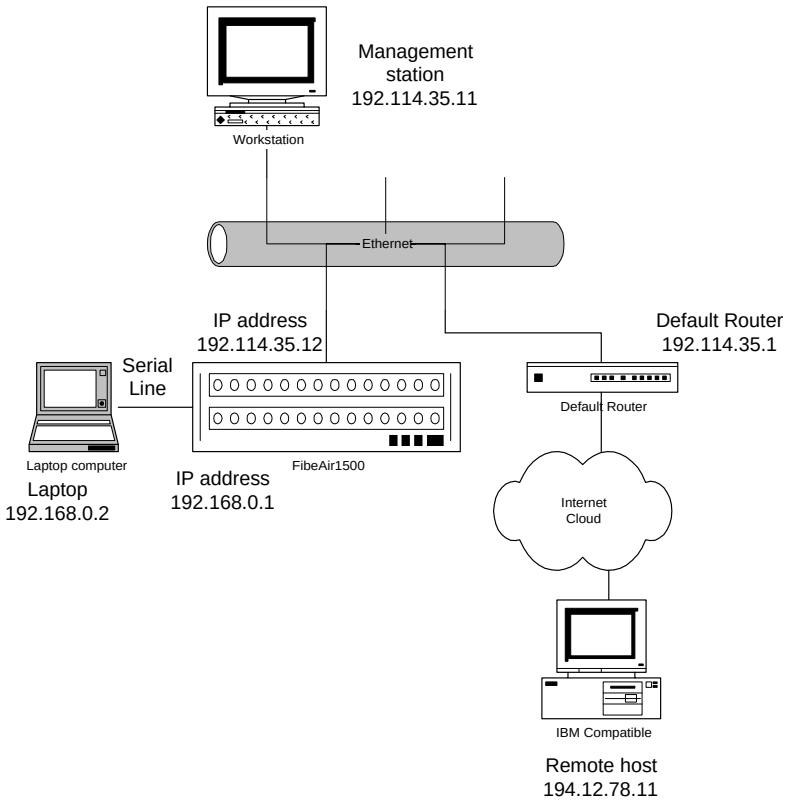


Figure 6-7 Typical Network Configuration

Check the Serial Connection

If the connection is via serial line, check the serial line speed in FibeAir, and in the Management station configuration. In the terminal, the serial line speed is specified using the IP Configuration menu.

Check the Ethernet Connection

Verify that the Management station and FibeAir IP interfaces have the same net ID. If they should not be included in the same network, check the default router address.

After performing the verifications above, if there is still a problem with network connectivity, together with the system administrator check for firewalls and routing configuration errors.

FibeAir 1500/1528 Alarm Messages

The following table lists FibeAir 1500/1528 system alarm messages. (For messages specific to FibeAir 1500A/1528A, or FibeAir 1500P, see the relevant sections later in this chapter.)

Message	Severity
ODU	
Power Supply status	Major
Synthesizer lock status	Major
TX level status	Minor
RX level status	Minor
Temperature status	Warning
IDU	
Power status	Major
Cable open status	Major
Modem Lock status	Major
Temperature	Warning
Loopback status	Major
External alarm 1 status	
External alarm 2 status	
External alarm 3 status	
External alarm 4 status	
External alarm 5 status	
External alarm 6 status	
External alarm 7 status	
External alarm 8 status	
Remote connectivy status	Major
Inner communication status	Minor
RST	
Line loss of frame status	Major
Radio loss of frame status	Major
Line EXC status	Major
Radio EXC status	Major
Line SD status	Minor
Radio SD status	Minor
Loss of signal status	Major
J0 mismatch	Minor

Alarm Log File Messages

The following table lists alarm messages that may appear in FibeAir alarm log files, the traps issued to network management, and possible corrective actions.

Remember to check active alarms to verify which faults are still active and require attention.

Message	Trap Issued	Cause / Corrective Action
ODU POWER *xx* FAILURE	Power supply	Problem in one of the power supplies in the ODU (except the +5v). To correct: Check current alarm status
ODU POWER *xx* OK	Power supply	1. Power supplies are checked periodically. If there was a failure, or during unit power-up the power supply is OK, this message is issued.
ODU XBAND SYNTHESIZER IS UNLOCKED	Radio	Synthesizer is unlocked. This can either be a momentary synchronization loss, or a hardware failure. If this alarm does not clear in a short while, the ODU needs to be replaced.
ODU XBAND SYNTHESIZER IS LOCKED	Radio	Previous error is cleared. To correct: Check current alarm status.
ODU IF CONVERTER *xx* LOCKED	Radio	Synthesizer is unlocked. This can either be a momentary synchronization loss, or a hardware failure. If alarm does not clear in a short while, the ODU needs to be replaced. Suggested: Check current alarm status.
ODU IF CONVERTER *xx* UNLOCKED	Radio	Previous error is cleared.
ODU TX LEVEL IS OUT OF RANGE	Radio	Actual transmitted power differs by more than 3 dB from the required power. This can be due to one of the folowing: 1. Extreme temperature conditions 2. Hardware failure Note: This warning does not always require immediate action, the data may still be OK on the radio link. To correct: 1. Check RSL level at the remote terminal, and compare it to the calculated unfaded Rx level. If there is a change of more than 3 dB in the Rx level, change the Tx power level in the local ODU Configuration window. 2. Check if the ODU is operating in extreme temperature conditions. Such conditions may cause variations in the Tx output power level.

Message	Trap Issued	Cause / Corrective Action
ODU TX LEVEL IS IN RANGE	Radio	Previous error is cleared.
ODU RX LEVEL IS OUT OF RANGE	Radio	The actual received level (after AGC circuits) differs from the expected level. This may be caused by one of the following: 1. The received signal is too weak or too strong. 2. Hardware failure. To correct: 1. Check current alarm status. 2. If the radio alarm is still active, contact your Ceragon distributor.
ODU RX LEVEL IS IN RANGE	Radio	Previous error is cleared.
ODU ATPC IS NOT ACTIVE	Radio	Future use only.
ODU ATPC IS ACTIVE	Radio	Future use only.
ODU EXTREME TEMPERATURE CONDITIONS	Temperature	ODU temperature is either above +67 C (152 F) or below -37 C (-34 F). To correct: 1. Check current alarm status. 2. If the Temperature alarm is still active, contact your Ceragon distributor.
ODU NORMAL TEMPRATURE CONDITIONS	Temperature	ODU temperature was restored to normal operating conditions: -33 C (-27 F) < T < 63 C (145 F)
ODU LOOPBACK IS NOT ACTIVE	Maintenance	Future use only.
ODU LOOPBACK IS ACTIVE	Maintenance	Future use only.
MUX LINE LOSS OF FRAME (LLOF)	SONET/SDH	After three consecutive SONET/SDH (main channel only) frame losses, this alarm is issued. To correct: 1. Check current alarm status. 2. If the Sonet alarm is still active, contact your Ceragon distributor.
MUX NO LINE LOSS OF FRAME	SONET/SDH	Issued when a valid frame is recognized following an LLOF state.
MUX LINE LOSS OF SIGNAL (LOS)	Line	Main channel does not receive a valid input signal. To correct: 1. Check current alarm status. 2. If the Line alarm is still active, contact

Message	Trap Issued	Cause / Corrective Action
		your Ceragon distributor.
MUX NO LINE LOSS OF SIGNAL	Line	Issued when a signal is resent to the main channel.
MUX JO MISMATCH	SDH	The received J0 string is different than the expected string. To correct: 1. Check current alarm status. 2. If the Sonet alarm is still active, contact your Ceragon distributor.
MUX NO JO MISMATCH	SDH	The received J0 string is now identical to the expected one.
MUX RADIO LOSS OF FRAME (RLOF)	SONET/SDH	After three consecutive radio channel frame losses this alarm is issued (link disconnected). To correct: 1. Check current alarm status. 2. If the Sonet alarm is still active, contact your Ceragon dealer.
MUX NO RADIO LOSS OF FRAME	SONET/SDH	Issued when a valid frame is recognized following an RLOF state
MUX LINE SIGNAL DEGRADE	BER	Issued when the SDH/SONET line BER drops below the defined level for “signal degrade” (SDH/Sonet Configuration menu). To correct: 1. Check current alarm status. 2. If the BER alarm is still active, contact your Ceragon distributor.
MUX NO LINE SIGNAL DEGRADE	BER	Issued when the SDH/SONET line BER returns to a level above the defined level for “signal degrade” (SDH/Sonet Configuration menu).
MUX LINE EXCESSIVE ERRORS	BER	Issued when the SDH/SONET line BER drops below the defined level for “excessive errors” (SDH/Sonet Configuration menu). To Correct: 1. Check current alarm status. 2. If the BER alarm is still active, contact your Ceragon distributor.
MUX NO LINE EXCESSIVE ERRORS	BER	Issued when the SDH/SONET line BER returns to a level above the defined level for “excessive errors” (SDH/Sonet Configuration menu).
MUX RADIO SIGNAL DEGRADE	BER	Issued when the radio BER drops below the defined level for “signal degrade” (SDH/Sonet Configuration menu). To correct:

Message	Trap Issued	Cause / Corrective Action
		1. Check current alarm status. 2. If the BER alarm is still active, contact your Ceragon distributor.
MUX NO RADIO SIGNAL DEGRADE	BER	Issued when the radio BER returns to a level above the defined level for “signal degrade” (SDH/Sonet Configuration menu).
MUX RADIO EXCESSIVE ERRORS	BER	Issued when the radio BER drops below the defined level for “excessive errors” (SDH/Sonet Configuration menu). To correct: 1. Check current alarm status. 2. If the BER alarm is still active, contact your Ceragon distributor.
MUX NO RADIO EXCESSIVE ERRORS	BER	Issued when the radio BER returns to a level above the defined level for “excessive errors” (SDH/Sonet Configuration menu).
IDU POWER 5V FAILURE	Power Supply	Problem in the IDU +5V power supply. To correct: 1. Check current alarm status. 2. If the Power supply alarm is still active, contact your Ceragon distributor.
IDU POWER 5V OK	Power Supply	Power supplies are checked periodically. If a failure occurs, or during unit power-up when the power supply is OK, this message is issued.
IDU POWER 8V FAILURE	Power Supply	Problem in the IDU +8V power supply. To correct: 1. Check current alarm status. 2. If the Power supply alarm is still active, contact your Ceragon distributor.
IDU POWER 8V OK	Power Supply	Power supplies are checked periodically. If a failure occurs, or during unit power-up when the power supply is OK, this message is issued.
IDU POWER 3.3V FAILURE	Power Supply	Problem in the IDU +3.3V power supply. To correct: 1. Check current alarm status. 2. If the Power supply alarm is still active, contact your Ceragon distributor.
IDU POWER 3.3V OK	Power Supply	Power supplies are checked periodically. If a failure occurs, or during unit power-up when the power supply is OK, this message is issued.

Message	Trap Issued	Cause / Corrective Action
IDU POWER –5V FAILURE	Power Supply	Problem in the IDU -5V power supply. To correct: 1. Check current alarm status. 2. If the Power supply alarm is still active, contact your Ceragon distributor.
IDU POWER –5V OK	Power Supply	Power supplies are checked periodically. If a failure occurs, or during unit power-up when the power supply is OK, this message is issued.
IDU CABLE IS OPEN	Cable	A sensor in the IDU detects that the IDU-ODU cable is disconnected. To correct: Verify that the cable is connected properly.
IDU CABLE IS SHORT	Cable	A sensor in the IDU detects that the IDU-ODU cable is shorted. To correct: 1. Disassamble the RF connector on both sides. 2. Check for shorts in the cable (DVM). 3. Reassemble the RF connectors.
IDU CABLE IS OK	Cable	Previous error is cleared.
IDU MODULATOR FAILURE	Modem	Unsynchronized SDH/Sonet clock with a large frequency offset (this can happen also in loopbacks with external equipment in loop-timing “slave” mode). Internal hardware failure. To correct: 1. Check current alarm status. 2. If the Modem alarm is still active, contact your Ceragon distributor.
IDU MODULATOR OK	Modem	Previous error is cleared.
IDU DEMODULATOR FAILURE	Modem	Issued after several consecutive radio channel frame losses (link disconnected). To correct: 1. Check current alarm status. 2. If the Modem alarm is still active, contact your Ceragon distributor.
IDU DEMODULATOR OK	Modem	Previous error is cleared.

Message	Trap Issued	Cause / Corrective Action
IDU DEMODULATOR FIFO OVERFLOW	Modem	To correct: 1. Check current alarm status. 2. If the Modem alarm is still active, contact your Ceragon distributor.
IDU DEMODULATOR FIFO OK	Modem	None - normal operation.
IDU DEMODULATOR PLL FAILURE	Modem	To correct: 1. Check current alarm status. 2. If the Modem alarm is still active, contact your Ceragon distributor.
IDU DEMODULATOR PLL OK	Modem	None - normal operation.
IDU DEMODULATOR TIMING LOOP FAILURE	Modem	To correct: 1. Check current alarm status. 2. If the Modem alarm is still active, contact your Ceragon distributor.
IDU DEMODULATOR TIMING LOOP OK	Modem	None
IDU DEMODULATOR PHASE LOOP FAILURE	Modem	To correct: 1. Check current alarm status. 2. If the Modem alarm is still active, contact your Ceragon distributor.
IDU DEMODULATOR PHASE LOOP OK	Modem	None
IDU DEMODULATOR SYMBOL ESTIMATE ERROR	Modem	To correct: 1. Check current alarm status. 2. If the Modem alarm is still active, contact your Ceragon distributor.
IDU DEMODULATOR SYMBOL ESTIMATE OK	Modem	None
IDU EXTREME TEMPERATURE CONDITIONS	Temperature	IDU temperature is either above +50C (122 F). To correct: 1. Check current alarm status. 2. If the Temperature alarm is still active, contact your Ceragon distributor.
IDU NORMAL TEMPERATURE CONDITIONS	Temperature	IDU temperature was restored to normal condition: T > 47 C (116 F).
IDU FAN FAILURE	Temperature	There is a fault in one of the IDU venting fans. To correct: 1. Check current alarm status.

Message	Trap Issued	Cause / Corrective Action
		2. If the Temperature alarm is still active, contact your Ceragon distributor.
IDU FAN OK	Temperature	There was a fault in one of the IDU venting fans, but the problem no longer exists.
IDU LOOPBACK IS ACTIVE	Maintenance	To correct: If not in maintenance test, terminate the loopback from the CeraView Loopback window.
IDU NO LOCAL LOOPBACK	Maintenance	None - normal operation
IDU REMOTE LOOPBACK	Maintenance	The remote IDU is now in loopback mode. To correct: If not in maintenance test, terminate the loopback from the CeraView Loopback window.
IDU NO REMOTE LOOPBACK	Maintenance	The remote IDU is running normally (after being in Loopback mode).
IDU LINE LOOPBACK	Maintenance	To correct: If not in maintenance test, terminate loopback from the CeraView Loopback window.
IDU NO LINE LOOPBACK	Maintenance	None - normal operation
IDU REMOTE COMMUNICATION FAULT	System Fault	Communication between the local and remote terminals was disconnected (data may still be exchanged with BER). To correct: 1. Check cable. 2. If the System Fault alarm is still active, contact your Ceragon distributor.
IDU REMOTE COMMUNICATION OK	System Fault	Communication between the local and remote terminals returned to normal.
IDU ODU COMMUNICATION FAULT	System Fault	Communication between the IDU and ODU was disconnected (channel data may still be exchanged without BER). To correct: If the System Fault alarm is still active, contact your Ceragon distributor.
IDU ODU COMMUNICATION OK	System Fault	Communications between the IDU and ODU returned to normal.

Message	Trap Issued	Cause / Corrective Action
IDU MUX COMMUNICATION FAULT	System Fault	Internal IDU failure. IDU may require corrective maintenance. Main channel data may still be exchanged, but loopbacks may not be possible. To correct: 1. Check current alarm status. 2. If the System Fault alarm is still active, contact your Ceragon distributor.
IDU MUX COMMUNICATION OK	System Fault	Previous alarm is cleared.

FibeAir 1500P Alarm Messages

The following tables list traps issued to the network management and alarm messages that may appear in the FibeAir 1500P alarm log file.

ODU

Name	LED	Default Severity	Text
Power Supply	ODU	Major	ODU 5/8/12/-12V POWER SUPPLY FAILURE RAISED/CLEARED
Synthesizer lock	ODU	Major	SYNTHESIZER #1/2/3 UNLOCKED RAISED/CLEARED
TX out of range	ODU	Minor	TX LEVEL OUT OF RANGE RAISED/CLEARED
RX out of range	ODU	Minor	RX LEVEL OUT OF RANGE RAISED/CLEARED
ODU EXTEREME TEMP.	ODU	Warning	ODU TEMPERATURE OUT OF RANGE RAISED/CLEARED
ODU LOOPBACK IS ACTIVE	LOOPBACK	Major	ODU LOOPBACK (NOT) ACTIVE
TX Mute	ODU	Warning	TX MUTE ON/OFF
LOS on IF cable from IDU	IDU	Major	ODU #n LOS on IF cable from IDU RAISED/CLEARED
ODU XPIC cable failure, only when all 3 synthesizers have unlock indication (1,2,3) for current ODU	ODU	Major	XPIC cable failure RAISED/CLEARED
ODU_Reset	ODU	Event	ODU reset event
ODU XPIC share clock problem	ODU	Event	ODU #n GENERAL HARDWARE FAULT #1 RAISED/CLEARED

MUX

Name	LED	Default Severity	Text
Fiber LOS	Online interface LED	Critical	LOS ON Drawer #n FIBER #k RAISED/CLEARED
Fiber LOF	Online interface LED	Critical	LOF ON Drawer #n FIBER #k RAISED/CLEARED
Radio LOF	Radio	Critical	LOF ON RADIO #n INTERFACE #k RAISED/CLEARED
TIM	Online interface LED	Minor	TIM ON Drawer #n FIBER #k RAISED/CLEARED
Radio SD	Radio	Minor	BER (SD) ON RADIO #n INTERFACE #k RAISED/CLEARED
Radio EXC	Radio	Major	BER (EXC) ON RADIO #n INTERFACE #k RAISED/CLEARED
Fiber SD	Online interface LED	Minor	BER (SD) ON Drawer #n FIBER #k RAISED/CLEARED
Fiber EXC	Online interface LED	Major	BER (EXC) ON Drawer #n FIBER #k RAISED/CLEARED
Unexpected signal	Online interface	Warning	Unexpected signal on Drawer #n Fiber #k

FE + 8xE1 MUX

Name	LED	Default Severity	Text
Loss of CARRIER in Ethernet interface (FE + 8xE1)	Online interface LED	Major	Loss of CARRIER on interface #n on drawer #k RAISED/CLEARED
LOS on E1	Online interface	Major	LOS on E1/T1 interface #n on drawer #K RAISED/CLEARED
E1/T1 SD	Online interface	Minor	BER (SD) ON Drawer #n INTERFACE #k RAISED/CLEARED
E1/T1 EXC	Online interface	Minor	BER (EXC) ON Drawer #n INTERFACE #k RAISED/CLEARED
Unexpected signal	Online interface	Warning	Unexpected signal on Drawer #n Fiber #k
Loopback on E1/T1 line	LPBK	Major	INTERNAL/EXTERNAL LOOPBACK ON E1/T1 #n RAISED/CLEARED

Drawer

Name	LED	Default Severity	Text
Link ID	Drawer	Critical	DRAWER #n LINK ID MISMATCH RAISED/CLEARED
Power supply	Drawer	Major	DRAWER #n POWER SUPPLY FAILURE RAISED/CLEARED
Cable	Cable	Major	DRAWER #n IDU-ODU CABLE open/short RAISED/CLEARED
Cable	Cable	Major	Cable IDU-ODU swap DRAWER #n RAISED/CLEARED
EXTEREME TEMP	Drawer	Warning	DRAWER #n EXTEREME TEMP. CONDITIONS RAISED/CLEARED
LOOPBACK of Fiber	LOOPBACK	Major	INTERNAL/EXTERNAL LOOPBACK ON FIBER #n RAISED/CLEARED
LOOPBACK of Radio	LOOPBACK	Major	INTERNAL/EXTERNAL LOOPBACK ON RADIO #n RAISED/CLEARED
Internal communication	ODU	Warning	DRAWER- ODU COMMUNICATION FAIL RAISED/CLEARED
Remote communication fault	RMT	Major	Remote Communication Fault
Modem configuration script not found	Drawer	Major	Drawer #n modem configuration file not found RAISED/CLEARED
Drawer ID Mismatch	Drawer	Major	Drawer #n ID mismatch RAISED/CLEARED
LOS on ODU IF cable	ODU	Major	DRAWER #n LOS on ODU IF cable
IDU Synthesizer lock	Drawer	Major	DRAWER #n GENERAL HARDWARE FAULT #1 RAISED/CLEARED
XO failure - modem board	Drawer	Major	DRAWER #n GENERAL HARDWARE FAULT #2 RAISED/CLEARED
XO failure - mux board	Drawer	Major	DRAWER #n GENERAL HARDWARE FAULT #3 RAISED/CLEARED
IDU XPIC HW fault	Drawer	Major, only in XPIC mode	DRAWER #n GENERAL HARDWARE FAULT #4 RAISED/CLEARED

Name	LED	Default Severity	Text
DAC failure	Drawer	Major	DRAWER #n GENERAL HARDWARE FAILURE #5 RAISED/CLEARED
FPGA load failure - Mux	Drawer	Major	DRAWER #n GENERAL HARDWARE FAILURE #6 RAISED/CLEARED
FPGA load failure - Modem	Drawer	Major	DRAWER #n GENERAL HARDWARE FAILURE #7 RAISED/CLEARED
No power to Mux board	Drawer	Major	No power to Board #1 in DRAWER #k Raised/Cleared
No power to Modem board	Drawer	Major	No power to Board #2 Raised/Cleared in DRAWER #k Raised/Cleared
Mux Board configuration failure - Can't detect board configuration (can't read from E2PROM)	Drawer	Major	DRAWER #n GENERAL HARDWARE FAULT #8 RAISED/CLEARED
Mux Board configuration failure - Error during reading board configuration, CRC error	Drawer	Major	DRAWER #n GENERAL HARDWARE FAULT #9 RAISED/CLEARED
Modem Board configuration failure - Can't detect board configuration (can't read from E2PROM)	Drawer	Major	DRAWER #n GENERAL HARDWARE FAULT #10 RAISED/CLEARED
Modem Board configuration failure - Error during reading board configuration, CRC error	Drawer	Major	DRAWER #n GENERAL HARDWARE FAULT #11 RAISED/CLEARED
E1/T1 LOS	Controlled by H/W	Minor	Wayside Channel LOS on line
Loopback on Wayside channel E1/T1	-----	Minor	INTERNAL/EXTERNAL LOOPBACK ON E1/T1 #n RAISED/CLEARED

IDC

Name	LED	Default Severity	Text
Fan	IDC	Warning	IDU FAN FAILURE RAISED/CLEARED
IDC Configuration Mismatch	IDC	Warning	User CONFIGURATION MISMATCH in drawer #n RAISED/CLEARED
IDC Firmware configuration mismatch	IDC	Warning	Firmware configuration mismatch in drawer #n RAISED/CLEARED
IDC HW. configuration mismatch	IDC	Warning	Hardware configuration mismatch in drawer #n RAISED/CLEARED
ODU configuration mismatch	IDC	Warning	ODU CONFIGURATION MISMATCH in drawer #n RAISED/CLEARED
Dual polarization mode frequency configuration mismatch, only in XPIC mode	IDC	Warning	ODU FREQUNCY MISMATCH BETWEEN LEFT AND RIGHT DRAWER RAISED/CLEARED
External Alarm	-----	According to configuration	According to configuration RAISED/CLEARED
IDC BIST failed	IDC	Major	IDC built in test failed on test #n RAISED/CLEARED
Ethernet loss of DRAWER	On Ethernet interface	Major	Wayside channel loss of DRAWER on interface #n RAISED/CLEARED
Cable	Cable	Major	Cable IDU-ODU swap DRAWER #n RAISED/CLEARED

Protection Alarms & Indications in the Alarm Log File

Name	Default Severity	Text
Change to Active	Major	PROTECTION CHANGE TO ACTIVE <reason>
Change to Standby	Major	PROTECTION CHANGE TO STANDBY <reason>
Change Remote Transmit - LOF	Event	PROTECTION CHANGE REMOTE TRANSMIT SENT - LOF
Change Remote Transmit - EXBER	Event	PROTECTION CHANGE REMOTE TRANSMIT SENT - EXBER
Cable	Major	PROTECTION CABLE DISCONNECTED
Cable	Major	PROTECTION COMM ERROR IN CABLE
Mate Power	Major	PROTECTION EXTERNAL MATE NOT EXIST
Mate Power	Major	PROTECTION INTERNAL MATE NOT EXIST
Protection Disabled	Major	PROTECTION DISABLED
Lockout	Major	PROTECTION LOCKOUT
Force Switch	Major	PROTECTION FORCE SWITCH
Manual Switch	Minor	PROTECTION MANUAL SWITCH
External Alarm	Minor	PROTECTION EXTERNAL ALARM SWITCH
Protection Mismatch	Minor	Protection Mismatch
Protection - IDU HW Mismatch	Critical	Protection - IDU HW Mismatch
Protection - IDU Firmware Mismatch	Critical	Protection - IDU Firmware Mismatch
Protection - IDU Configuration Mismatch	Critical	Protection - IDU Configuration Mismatch
Protection - ODU HW Mismatch	Critical	Protection - ODU HW Mismatch
Protection - ODU Configuration Mismatch	Critical	Protection - ODU Configuration Mismatch

FibeAir 1500A/1528A Alarm Messages

The following table lists alarm messages that may appear in the FibeAir 1500A/1528A alarm log file and the severity of each alarm.

Message	Severity
Fiber-LOS	Critical
RADIO-LOF	Critical
Fiber-LOF	Critical
RADIO-EXBER	Major
Fiber-EXBER	Major
RADIO-SD	Minor
Fiber-SD	Minor
Fiber-TIM	Minor
Radio-TIM	Minor
Radio-MS-AIS	Critical
Fiber-MS-AIS	Critical
Radio-MS-RDI	Major
Fiber-MS-RDI	Major
Radio-MS-EXBER	Major
Fiber-MS-EXBER	Major
Radio-MS-SD	Minor
Fiber-MS-SD	Minor
Radio-AU-LOP	Major
Fiber-AU-LOP	Major
Radio-AU-AIS	Major (see note 1 below)
Fiber-AU-AIS	Major (see note 1 below)
Radio-HP-UNEQ	Warning (see note 1 below) Relevant only for SONET 3xVC3, where the tributaries are DS3s, not only T1s
Fiber-HP-UNEQ	Warning (see note 1 below) Relevant only for SONET 3xVC3, where the tributaries are DS3s, not only T1s
Radio-HP-RDI	Major (see note 1 below)
Fiber-HP-RDI	Major (see note 1 below)
Radio-HP-TIM (1)	Minor
Fiber-HP-TIM (1)	Minor
Radio-HP-PLM (1)	Minor (see note 1 below)
Fiber-HP-PLM (1)	Minor

Message	Severity
Radio-HP-EXBER	Major
Fiber-HP-EXBER	Major
Radio-HP-SD	Minor
Fiber-HP-SD	Minor
Radio-TU-LOP	Minor
Fiber-TU-LOP	Minor
Radio-TU-AIS	Minor
Fiber-TU-AIS	Minor
Radio-TU-LOM (2,3)	Minor
Fiber-TU-LOM (2,3)	Minor
Radio-LP-UNEQ	Warning
Fiber-LP-UNEQ	Warning
Radio-LP-RDI	Minor
Fiber-LP-RDI	Minor
Radio-LP-TIM	Minor
Fiber-LP-TIM	Minor
Radio-LP-PLM	Minor
Fiber-LP-PLM	Minor
Radio-LP-EXBER (4)	Minor
Fiber-LP-EXBER (4)	Minor
Radio-LP- SD	Warning (see note 1 below)
Fiber-LP- SD	Warning (see note 1 below)
Tribs LOS	Major
Tribs UNEXP-Signal	Warning (see note 1 below)
Tribs AIS	Major
Tribs EXBER	Minor
Tribs SD	Warning
Unlock	Major (see note 1 below)
OOR	Major (see note 1 below)

Notes:

1. HP-TIM, HP-PLM, LP-TIM, and LP-PLM can be configured to prevent consequent actions.
2. TU_LOM (H4) causes LP-RDI, tributary AIS, and path protection switching for VC-12s/VC-11s and 2 Mbps/1.544 Mbps tributaries only, **not** for VC-3s and 34/45 Mbps tributaries.
3. TU_LOM (H4) causes pass-through TU AIS for TU-12s/VC-11s only, **not** for TU-3s.

Hitless System Alarm Messages

The following table lists alarm messages that may appear in the FibeAir alarm log file for Hitless systems, the trap issued to network management, and possible corrective actions.

Message	Trap Issued	Cause / Corrective Action
LOCAL RECEIVER NOT IN USE	None	Selective fading at the receiver.
LOCAL RECEIVER IN USE	None	Normal signal level at the receiver.
HITLESS FUNCTIONALITY PROBLEM RAISED	SYSTEM ALARM	Hitless cable problem, or Hitless (can be mate) module problem.
HITLESS FUNCTIONALITY PROBLEM CLEARED	SYSTEM ALARM	Hitless switching can be performed.
CONFIGURATION MISMATCH MATE / REMOTE HITLESS MODE RAISED	SYSTEM ALARM	The mate/remote unit was configured incorrectly. Check the mate/remote unit configuration.
CONFIGURATION MISMATCH MATE / REMOTE HITLESS MODE CLEARED	SYSTEM ALARM	The mate and remote units are both configured the same as the current unit.
HITLESS RADIO LOF RAISED	SDH ALARM	The local radio detected LOF. The problem may be caused by flat fading. Check your current alarm status. If the alarm appears continuously, contact your Ceragon dealer.
HITLESS CABLE DISCONNECT RAISED	SYSTEM ALARM	Hitless cable problem. Replace Hitless cable.
HITLESS CABLE PROBLEM CLEARED	SYSTEM ALARM	Hitless cable is OK.

Chapter 7
Protection Configuration

FibeAir 1500/1528 Protection

The FibeAir 1500/1528 Hot Standby 1+1 protection configuration is designed to ensure data link robustness and survivability in case of hardware or software failures, and to enable maintenance and repair operations without affecting the live traffic.

Fast hardware-based switching (50 ms) allows fast recovery from failures and minimizes the link downtime due to equipment failure.

Using the same hardware for the main and the back-up links minimizes inventory costs and simplifies equipment and operation flexibility.

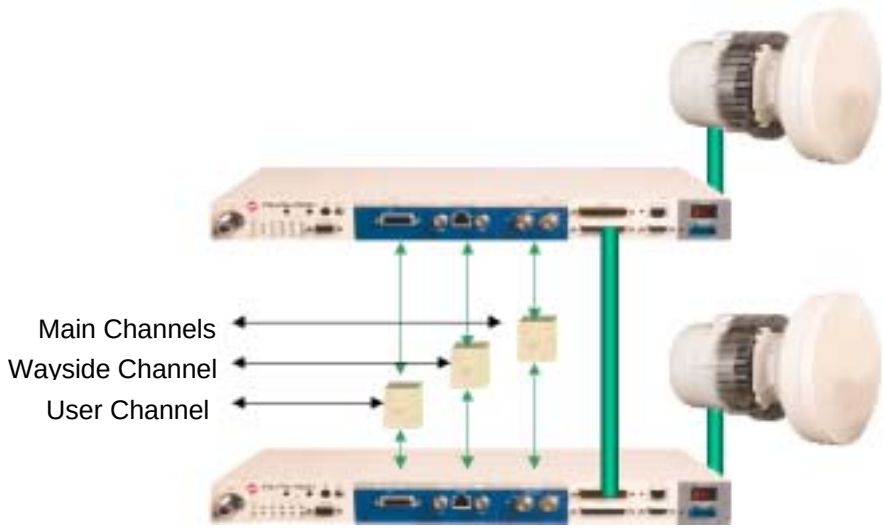


Figure 7-1 Hot Standby Protection Physical Configuration

The Hot-Standby configuration defines one unit on each side of the link as the active (**Master**) unit and the other as a standby (**Slave**) unit.

The Master transmits and receives data but the Slave only receives data. A single cable connects between the two IDU's protection ports and allows for negotiation and data exchange between the units.

Upon a failure in an active unit or a command from the remote side, the **Protection Switch** comes into effect and the standby unit becomes active.

Theory of Operation

The system protects the main link from an IDU or ODU unit failure on the local side, the remote side or both sides. However, simultaneous failures in both units on the same side cannot be protected.

A failure in the main data channel triggers the protection mechanism. After protection switching, all channels are transferred through a new active unit.

Four backup combinations are possible, as shown in the following figure.

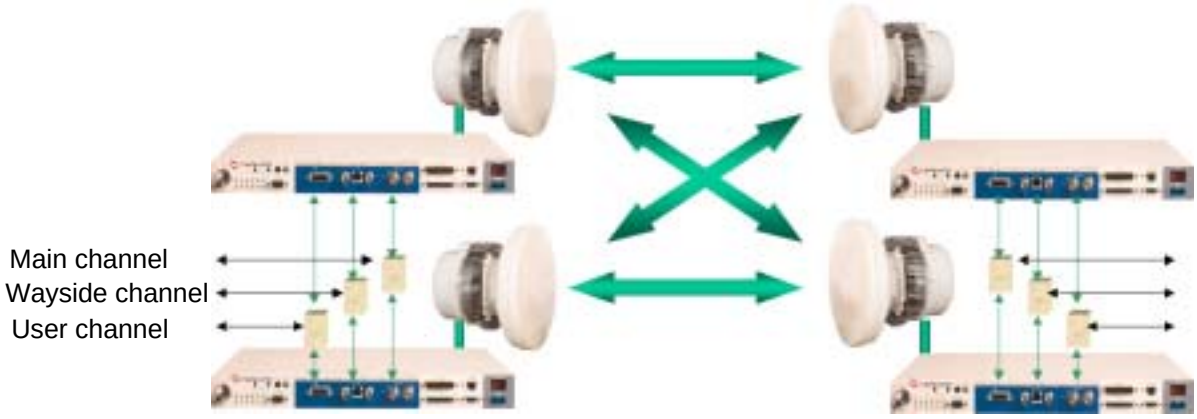


Figure 7-2 Hot Standby Backup Combinations

Configuration Options

The system provides two configuration options for protection: fully redundant link and shared antenna.

Fully Redundant Link

The fully redundant link consists of two complete links, as shown below.

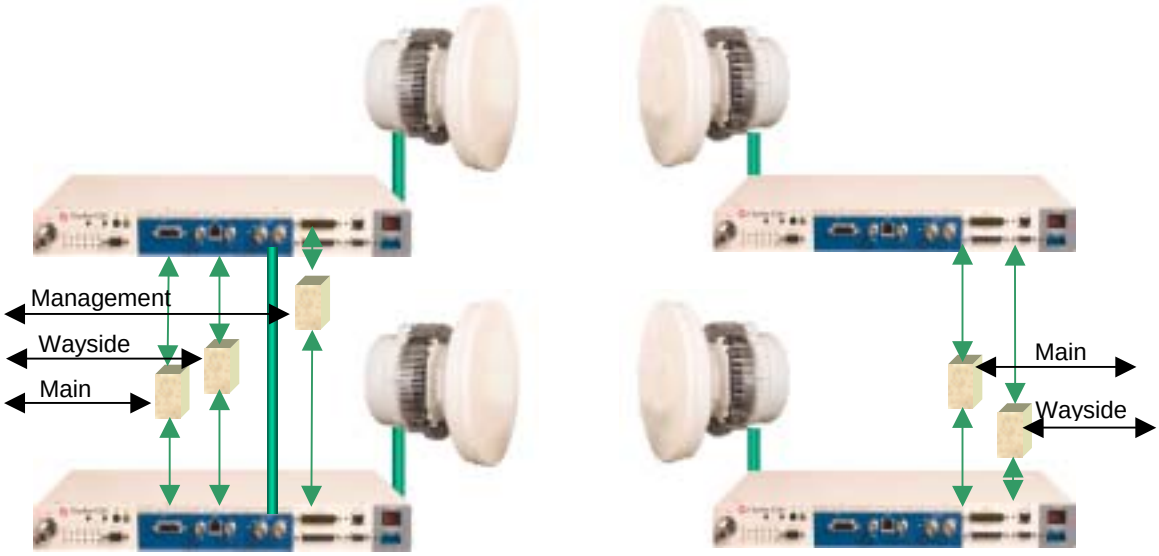


Figure 7-3 Fully Redundant Link Configuration

If no management connection exsts between the sides, the following configuration is recommended. This configuration enables all four units to be managed from a single connection on one side.

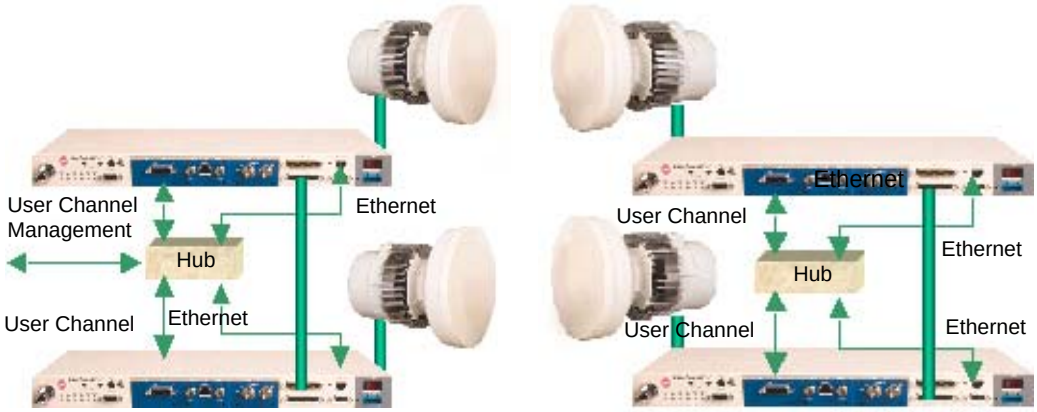


Figure 7-4 Single Side Management

Shared Antenna

In the shared antenna configuration, two ODUs share one antenna, as shown in the following figure.

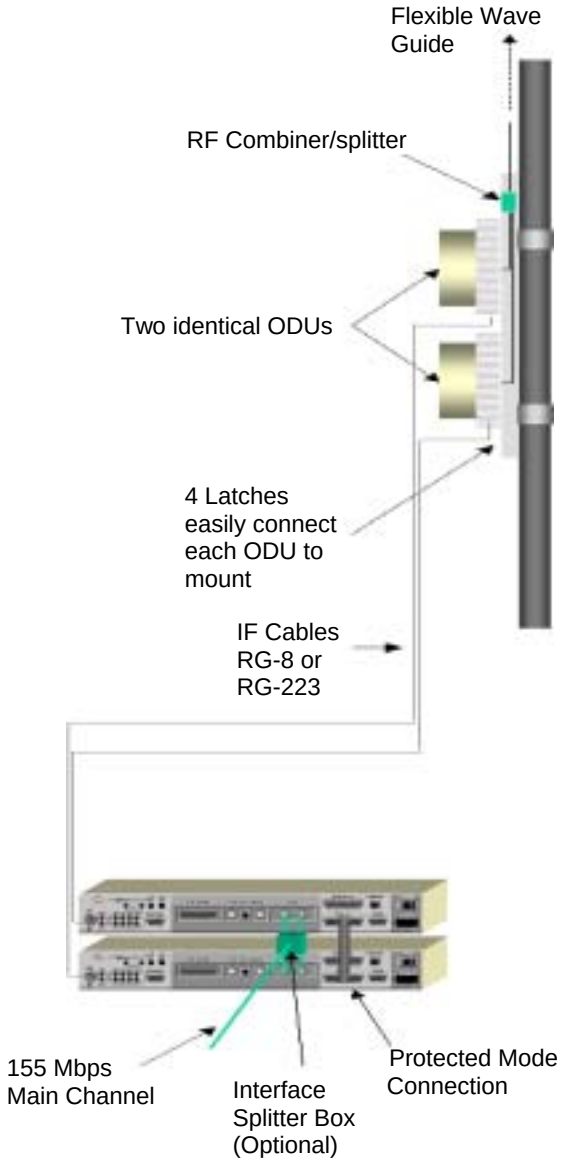

Flexible Wave Guide
RF Combiner/splitter
Two identical ODUs
4 Latches easily connect each ODU to mount
IF Cables RG-8 or RG-223
155 Mbps Main Channel
Interface Splitter Box (Optional)
Protected Mode Connection

Figure 7-5 Shared Antenna Configuration

Master and Slave Port Status

The slave RS232 and Ethernet/SLIP management interfaces are active and the traffic interfaces (main channel, user channel and wayside channel) are in “receive only” mode. This configuration does not allow the slave to transmit any data.

The master management and traffic interfaces are all active; the unit receives and transmits data.

Protection Switch Triggers

The following triggers cause protection switching:

- LOF line
- LOF radio
- ODU cable disconnection
- Manual command via SNMP
- Power off in on-line system
- Excessive BER radio (not line) threshold passed (configurable between 10^{-3} to 10^{-6})
- External alarm input 8 present (after config)

The master switch is only activated if the Slave is fully operational. When operational, the Slave is immediately fully initialized and thus has no radio or line frames loss.

"Change Remote Transmitter" Conditions

The Master will send a “Change Remote Transmitter” command to the remote side using the SDH overhead in the following circumstances:

- Both local units detect radio frame loss for 1 msec. In this case the “CHANGE REMOTE TRANSMITTER” message is added to the local Master event list.
- If the problem persists, the command will be sent once a second.

"Change Local Master" Conditions

The Slave will initiate “Change Master” command in the following circumstances:

- The Slave receives a “Change Transmitter” radio message.
- The “Mate OK” indication (via the communication cable) from the Master is missing, while the Slave does not have any errors on its line and radio interfaces and it recognizes a cable connection to its “Protected” port.

Initialization Process

At the initialization process, the first unit that activates will be set as Master.

- If two units become Masters on the same side (before on inter-mate cable connection has been made), they will negotiate via the inter-mate cable which one will take control.
- If both units are OK or both have LOF, the unit with the higher MAC address will be set as the Master.

If the inter-mate cable is disconnected when the units are in the Protected Mode:

- The Master will stay active and the Slave will stay in stand-by (Mute) mode.
- The protection option will not be operational for that side of the link.

Management

To provide separate remote management, configuration, maintenance, and monitoring for all four units in the link, each unit has its own IP address.

Both Master and Slave may be accessed via a TCP/IP-based network management system (SNMP, CeraView) since their Ethernet/SLIP ports are always active.

Manual changes of **IP address** and **Tx Mute** are performed separately for Master and Slave.

Other parameters may be changed as follows. This allows for configuring the two units with different parameters, if necessary:

- Any manual change in the Master will update the Slave (frequency, E1 wayside transparency, antenna size, Tx level, etc.)
- Any manual change in the Slave is unit specific and does not update the Master.

The Master and the Slave units report the following parameters separately to the network management system:

- Configuration data.
- Traps on “Master Switch” events and “Change Transmitter” messages.
- Performance monitoring data.

Event Log

The following messages can be written to the Event Log list for protection configuration management and monitoring:

- “Change remote transmitter” (if sent to the remote side)
- “Change to master”
- “Change to slave”
- “Protection cable disconnect”
- “Protection cable error”
- “Protection cable Ok”
- “Master slave disconnect”

LEDs

In the normal alarm state, the LEDs display the following colors:

Master

All LEDs are green.

Figure 7-6 Master LEDs

Slave

STBY - yellow

RMT - gray

Others - green

Figure 7-7 Slave LEDs

Protected System (1+1) Installation

1. Install one link according to the instructions in chapters 3&4. Set the frequency, transmit power, and align the antennas.
2. Shut down the power to the link.
3. Install the second link, set all parameters and align antennas.
4. Turn on each pair of terminals (IDU and ODU), confirm antenna alignment for all four possibilities (the other pair must be shut down), as shown in the following figure.

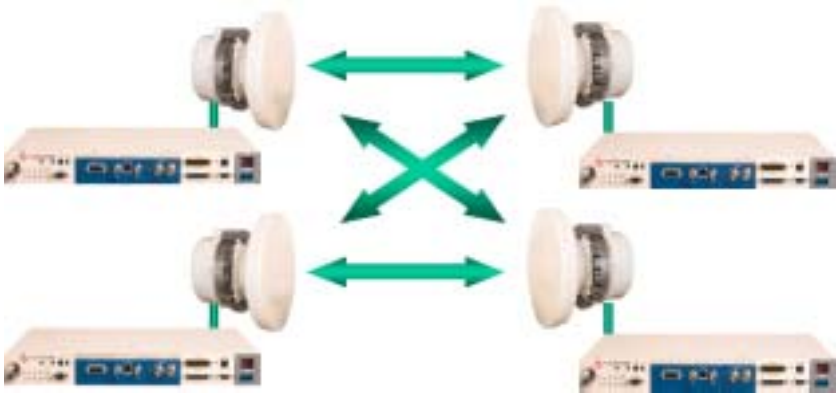


Figure 7-8 Redundant Configuration Possibilities

5. Connect the “protection cable” between the two IDU’s. The protection cable will connect to “protection” ports (RJ-45 or 25 Pin D-type connector). This depends on the type of FibeAir system in use.
6. Connect the interfaces through the interface splitters. In some cases, the CPE equipment has two ports, and therefore splitters are not required.

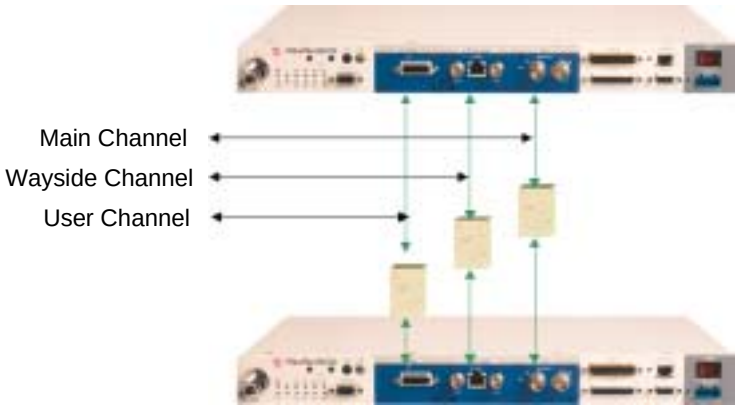


Figure 7-9 Splitter Connection

7. Turn the remaining two units (one on each side). By now, you should have all four units working, and the slave units should have yellow “STBY” LEDs lit.
8. Connect management interface to each one of the IDU’s. If Ethernet port is used, a small “hub” is required to connect the two IDU’s. If the remote side is managed via the user channel of the radio link (as described in figure 7-4), connect both User Channel and Ethernet ports on both sides of the link to respective hub. One of the hubs will be connected to a PC/LAN to provide management access.

FibeAir 1500A/1528A System Protection

The FibeAir 1500A/1528A Hot Standby 1+1 protection configuration is designed to ensure data link robustness and survivability in case of hardware or software failures, and to enable maintenance and repair operations without affecting the live traffic.

Fast hardware-based switching (50 ms) allows fast recovery from failures and minimizes the link downtime due to equipment failure.

Using the same hardware for the main and backup links minimizes inventory costs and simplifies equipment and operation flexibility.

The Hot Standby configuration defines one unit as the active (**Master**) unit and the other as a standby (**Slave**) unit.

The Master transmits and receives data, while the Slave only receives data. A single cable connects between the two IDU protection ports and allows for negotiation and data exchange between the units.

Upon a failure in an active unit, the **Protection Switch** takes effect and the standby unit becomes active.

Two protection configurations are available for the FibeAir 1500A/1528A: the Y Splitter configuration, and the H Splitter configuration.

Y Splitter Configuration

The Y Splitter configuration is used if the FibeAir 1500A/1528A protected system is the start (or end) system in the communication chain.

The following diagram shows the FibeAir 1500A/1528A Y Splitter configuration.

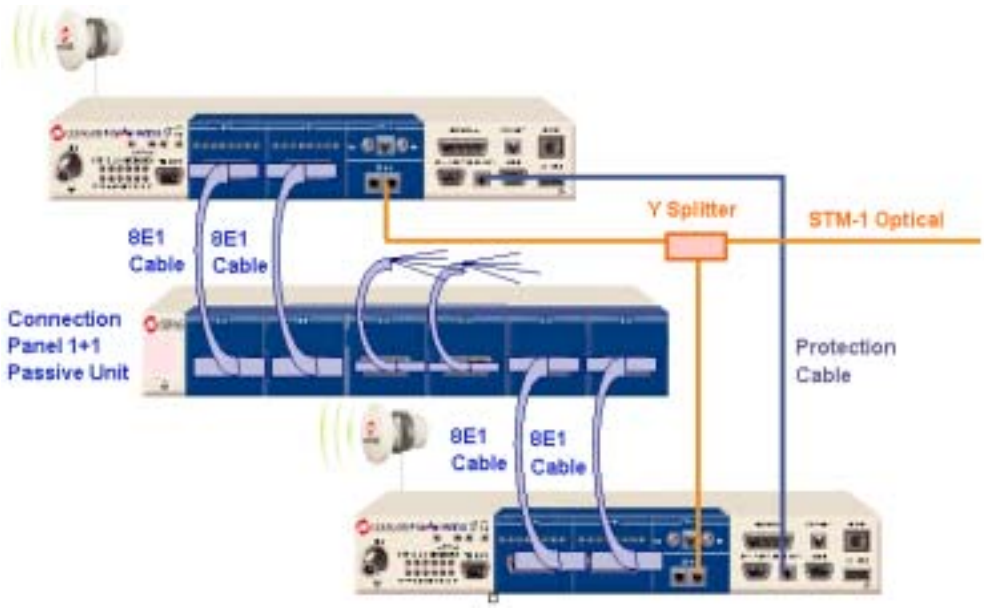


Figure 7-10 FibeAir 1500A/1528A Protected Configuration using Y Splitter

The FibeAir 1500A/1528A Y Splitter configuration includes the following connection components:

8 E1 Cable	Four 0.5 meter cables used to connect the 8E1 IDU interface to the Connection Panel.
Y Splitter	Used to split the optical STM-1 line input to the IDUs. Note that the optical line includes two fiber lines, one for Tx and one for Rx. Therefore, in a standard Hot Standby system, 6 optical patches and 2 Y Splitters are used.
Connection Panel	Connects the 8 E1 interfaces of both IDUs for identical data flow. It is also used to connect the Impedance Adaptation panel which balances 75 ohm E1 inputs.
Protection Cable	Used to transfer protection switching controls between the units.

Y Splitter Configuration for Unbalanced E1s

When the E1s are unbalanced (75 ohm), an Impedance Adaptation panel is required to balance them (120 ohm). In this case, the Hot Standby Connection Panel also connects the Impedance Adaptation panel to the IDUs, as shown in the following diagram.

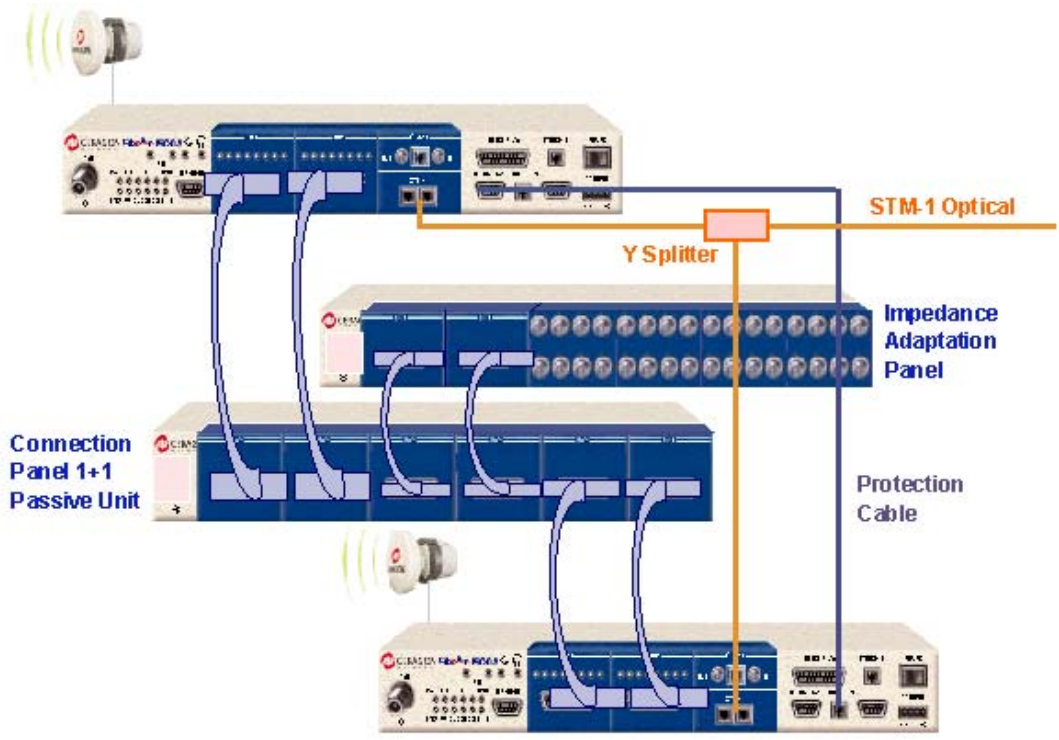


Figure 7-11 Protected Y Spiltter Configuration for Unbalanced E1s

H Splitter Configuration

The H Splitter configuration is used if the FibeAir 1500A/1528A protected system is linked to another FibeAir 1500A/1528A protected system in the communication chain.

The following diagram shows the FibeAir 1500A/1528A H Splitter configuration.

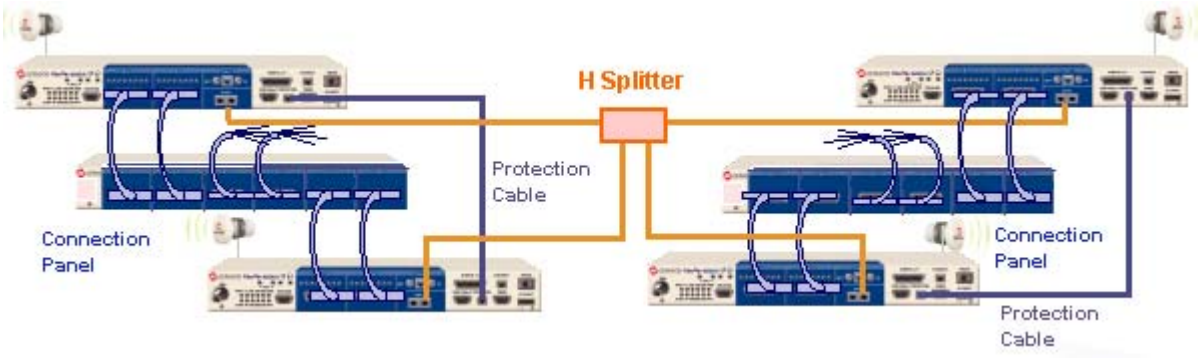


Figure 7-12 FibeAir 1500A/1528A Protected Configuration using H Splitter

Note that since the optical line includes Tx and Rx fibers, this configuration will consist of eight optical patches and two H Splitters.

Protection Switch Triggers

This section specifies the triggers that cause FibeAir 1500A/1528A protection switching.

Note that no switching will occur upon individual E1 line failure, in order not to interrupt the STM-1 stream in the protected chain.

STM-1 Fiber Fault

Fiber LOS/LOF - At the local side, if STM-1 fiber LOS/LOF is detected by the master IDU, protection switching will occur.

Remote Optical Transmitter Fault - If a remote optical transmitter fault occurs, a proprietary message with a switching command is sent to the remote slave. Protection switching will then occur.

Fiber EXBER - At the local side, if STM-1 Fiber EXBER is detected by the master IDU, protection switching will occur.

STM-1 Radio Fault

Radio LOF - At the local side, if STM-1 Radio LOF is detected by the master IDU, protection switching will occur.

Master & Slave Radio LOF - At the local side, if STM-1 Radio LOF is detected by the master IDU and slave IDU at the same time, protection switching will occur.

Radio EXBER - At the local side, if STM-1 Radio EXBER is detected by the master IDU, protection switching will occur.

CLU Fault

Interface Card LOC - At the local side, if LOC (Loss of Clock) is detected by the master IDU, protection switching will occur. (Applicable for E1 interfaces only).

Loss of ADD Clock - At the local side, if Loss of ADD clock is detected by the master IDU, protection switching will occur.

Loss of DROP Clock - At the local side, if Loss of DROP clock is detected by the master IDU, protection switching will occur.

Tributary Fault

Trib LOS - At the local side, if Trib LOS is detected by the Master IDU (and there is no Trib LOS at the local slave IDU), protection switching will occur. If, however, Trib LOS is detected by both the master and slave, a report will be generated and sent to the current alarm destination.

Driver Failure Monitor - At the local side, if any of the tributary port transmitters is shorted, protection switching will occur. (Applicable for T1 interfaces only).

Other Switch Criteria

Force Switch Local - When a *Force Switch* command is generated, protection switching will occur.

Software Reset - Upon software reset by the master IDU, protection switching will occur.

Power Fault - If a power failure is detected by the master IDU, protection switching will occur.

External Alarm #8 - If external alarm #8 is detected by the master IDU, protection switching will occur.

FibeAir 1500A/1528A Traffic Protection

The protection scheme for FibeAir 1500A/1528A SDH traffic is *Path Protection (1+1)*, which is applicable for ring topologies.

All traffic in the ring is fully protected.

Path protection guarantees end-to-end protection down to the tributary level.

The Path Protection mechanism can operate on either the HO (High Order) or LO (Low Order) level. The same TU signal is transmitted in both directions of the ring (east and west) to the receiver on the tributary interface. The tributary interface normally receives both signals and chooses the signal from the main path defined in the NMS.

In case of fiber or radio link disconnection, failure, or individual trail failure, a switch to the protected path will occur in **less than 50 msec**.

The criteria for automatic switch to the protection path incudes the following:

AIS (AU/MS/TU)	**Alarm Indication Signal (all signals)**
LOS	**Loss of Signal**
LOP (AU/TU)	**Loss of Pointer**
LOF	**Loss of Frame**
LOM (TU)	**Loss of Multiframe**
UNEQU (HP/LP)	Unequipped Signal
PLM (HP/LP)	Path Label Mismatch
TIM (HP/LP)	trace ID mismatch
EXC (MS/HP/LP)	Excessive Bit Error Rate

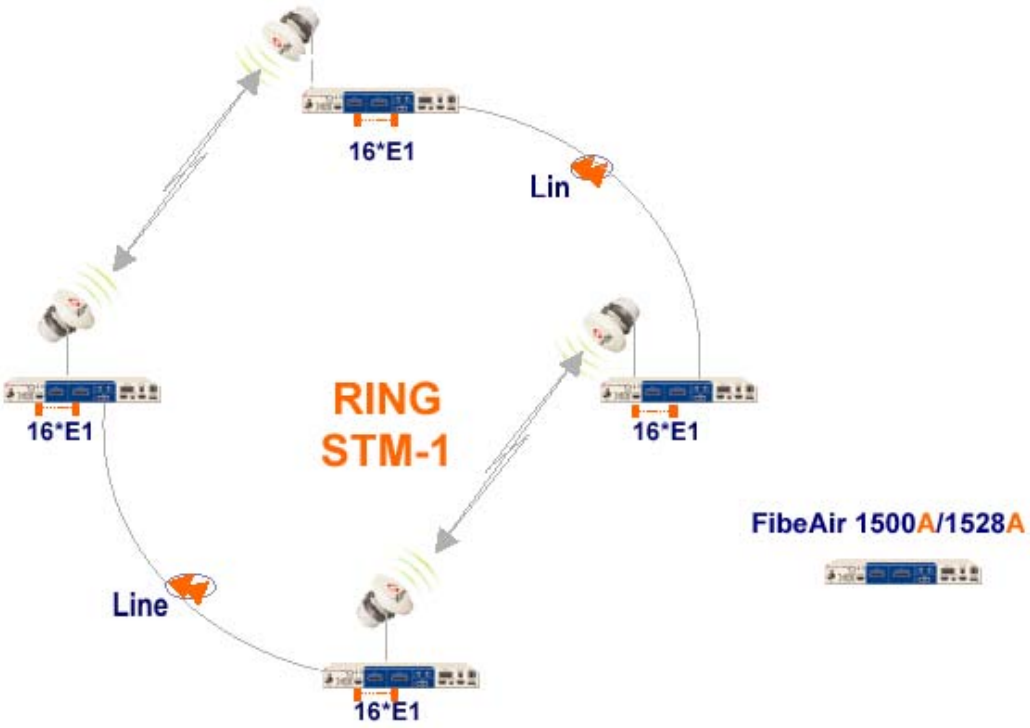
Note: High priority events appear in bold.

Automatic switching will occur if the selected path failed and Protection Lockout (inhibit function) is not active.

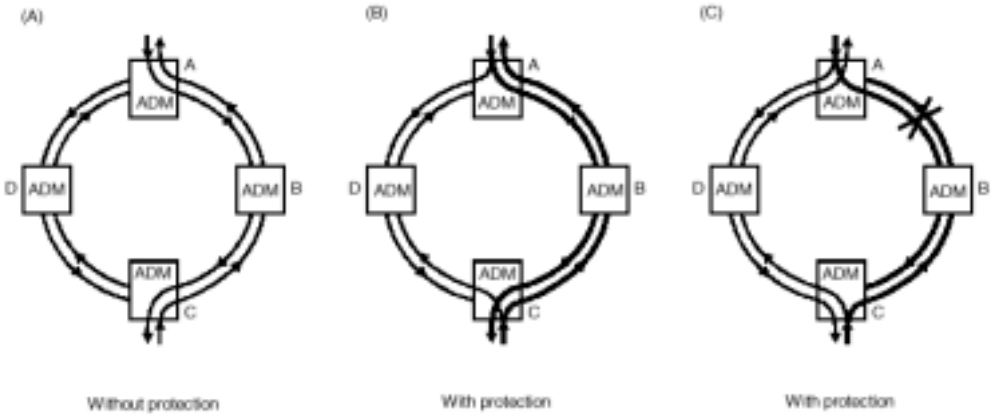
If the current active path reports one of the events listed above, but the protection path does not report any of the events, or some events with lower priority, switching will occur.

Manual switching is possible via the management system.

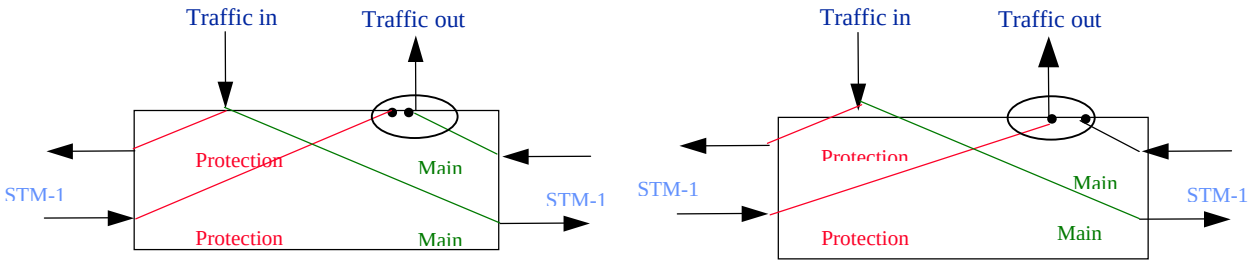
Traffic-protected ring is based on a uniformly routed (bi-directional) self-healing path protection mechanism, as shown in the following figures.



Typical Network



Uniformly Routed Self-Healing Path Protection Ring



Normal Operation **After Switching to Protection**

Trail Protection Mechanism

Revertive and Non-Revertive Switching

Path protection switching can be configured as Revertive (the default) or Non-Revertive.

In the Revertive mode, normal traffic on the protection path is switched back to the original path after it is recovered from the fault.

Revertive mode may be required to support specific services, whereby the shortest physical route offers better performance. For example, for synchronization of another network using protected E1. The main path will generally be shorter, and the protection path will be longer.

In the Non-Revertive mode, no switching to the original fault-cleared path is performed, to prevent unnecessary traffic hits and management event reports.

Traffic Protection Parameters

General traffic protection parameters for FibeAir 1500A/1528A include the following:

Holdoff Period	The delay between fault detection and subsequent switching. The purpose of this timer is to ensure that protection switching is not overly sensitive to transient variations in signal quality.
Wait To Restore Time	(Revertive mode only) A fixed period of time between switching to the protection path and back to the main path. During this time, no switching will occur.
Oscillation Guard Time	A period of time the inactive channel must be free of faults before it can carry traffic.

6-15 GHz FibeAir System Diversity Protection

6-15 GHz systems are affected more by multipath propagation, and less by rain, than higher frequencies.

There are two primary types of multipath impairments: *flat fading* and *selective fading*. Flat fading occurs when the entire spectrum of a channel is attenuated. Selective fading occurs when notches appear in the channel's spectrum.

Protecting 6-15 GHz systems from the impairments mentioned above requires diversity and a proper digital equalizer.

One of the following methods can be used for diversity:

- Space diversity
- Frequency diversity
- A combination of space and frequency diversity

Space Diversity

The Space Diversity method uses two FibeAir links with one active transmitter, and two active receivers on each side of the link. Each receiver is connected to a different antenna and the two antennas are vertically separated from each other.

When more than one path from transmitter to receiver exists due to atmospheric and surface conditions, time delays may result in degraded signal levels. Vertical separation reduces the probability that the receivers will receive the same signal degradation level caused by multipath conditions.

When two different paths are used for transmission, the best of the two can be selected for data transfer at any given time. The FibeAir *Hitless Switch* (described below) determines which path is delivering the best quality data.

An important advantage of the Space Diversity method is that it uses only one frequency channel.

Frequency Diversity

The Frequency Diversity method uses two FibeAir links, with two active transmitters and receivers on each side of the link connected to one or two antennas. The two transmitters on either side of the link operate at different frequencies, and the FibeAir *Hitless Switch* (described below) determines which receiver is receiving the best quality data.

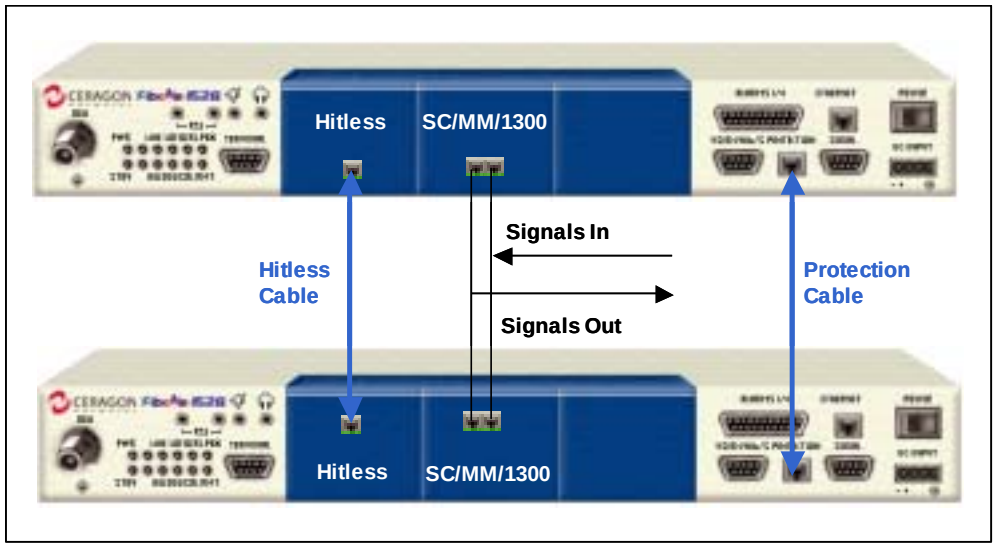
Frequency diversity allows the system to automatically select a frequency for which the channel performance is better than the other frequency.

FibeAir's Hitless System

FibeAir's Protected Hitless System consists of two FibeAir 1528 links connected via a protection cable, hitless switches, and a hitless cable.

The Hitless system allows fast switching between FibeAir units without corrupting the data delivered to the user.

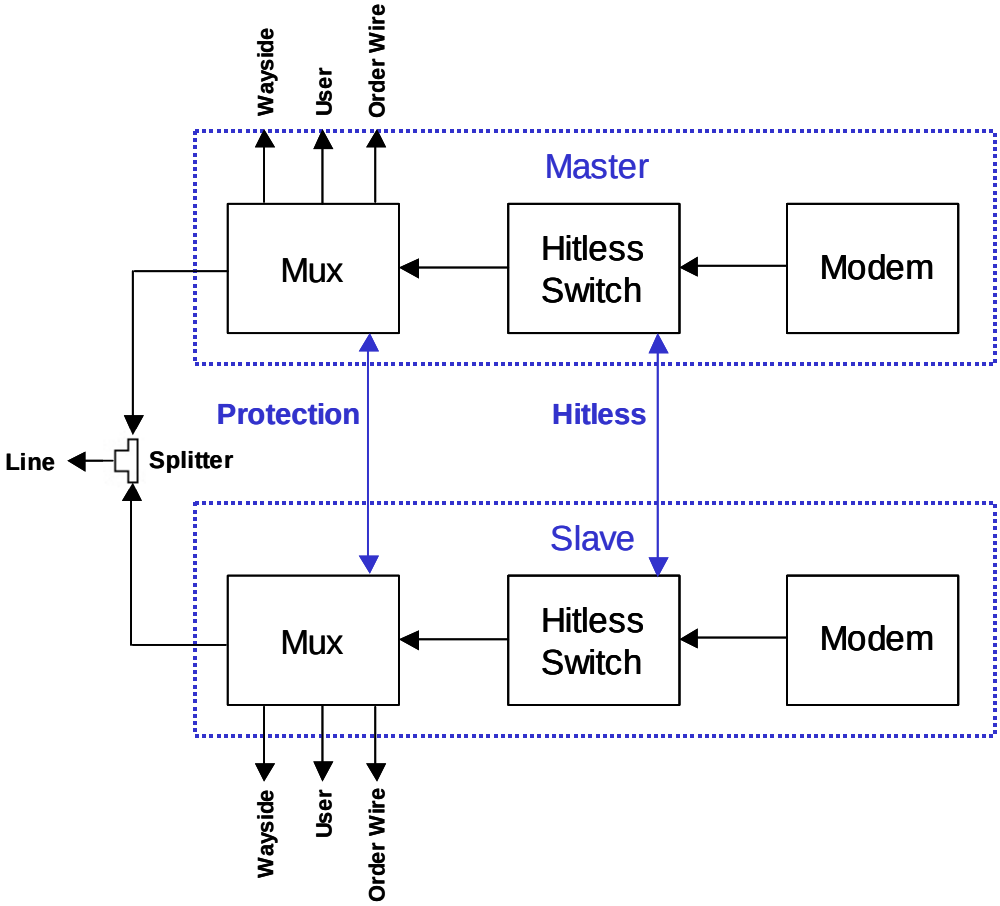
The following illustration shows how the system is connected.



The hitless system offers the following advantages:

- Maintains data integrity during severe link outages.
- Errorless during switching.
- Supports space and frequency diversity.

The following block diagram shows the protected hitless switch configuration components and how they interact.



A special proprietary algorithm determines which ODU is transmitting error-free data. The error-free data is then passed on by the master switch in the IDU to the network.

FibeAir 1500P Protection

FibeAir 1500P protected systems offer high quality data transfer integrity and simple connectivity.

Protected systems supported by FibeAir 1500P include the following:

- STM-1 1+1 (internal)
- 2xSTM-1 1+1, 311 Mbps over 28 MHz using XPIC (external protection with 2 IDUs)
- 311 Mbps 1+1 over 56 MHz (internal)

Internal Protection

FibeAir 1500P protected systems offer high quality data transfer integrity and simple connectivity. Since the internal protection mechanism is implemented within the IDUs, no additional cabling is required. The internal protection is valid for 155 Mbps and 311 Mbps carriers, since FibeAir 1500P can include two front panel IDMs (In-Door Modules).

Note that for internal FibeAir 1500P protection, both IDMs must be configured with the same carrier.

External Protection

FibeAir 1500P systems working with the internal XPIC mechanism can be protected externally using 2 IDUs with an additional cable connecting between the 2 IDCs (IDU Controllers).

In externally protected FibeAir 1500P systems, IDU units are connected via an internal RJ-45 8-pin protection cable, with the following pinout:

Pin	Function
1	GND
2	Self_Actv_Stby / Self_Priority
3	SCC_Tx
4	Self_Cable_Exist
5	Mate_Priority / Mate_Actv_Stby
6	SCC_Rx
7	Mate_Cable_Exist
8	GND

Switch Time

The entire switching mechanism time is less than 50 ms.

Switching Criteria

The FibeAir 1500P Protection mechanism will perform a switch from a main unit to a secondary unit based on a Priority Table. The Priority Table below lists all the events that can trigger a protection switch, in order of their importance:

Priority	State
1	Lockout
2	Force Switch
3	Chng_Rmt_Radio_LOF
4	Radio_EXCB
5	Chng_Rmt_Radio_EXCB
6	Manual Switch
7	External Alarm

Lockout - user-configurable, no switching is allowed on the local side.

Force Switch - a switch performed by the user.

Radio_EXCB - Excessive BER [10^{-6} :10^{-3}] from the radio. The BER will be calculated in the IDC, and an indication will be sent to the protection.

Manual Switch - a switch request from the user, applicable when all other priorities are cleared.

External Alarm - an alarm generated by an external source.

LED Indications

LED indications on the FibeAir 1500P front panel relevant to protected systems include the following:

Drawer	LED	Possible Indications	Severity
Carrier	Shelf	Green - active	-
		Yellow - standby	-
		Red - protection related - MUX/Modem hardware failure *or:* Protection mismatch	Major
IDC	Prot	Green - protection cable OK	-
		Red - protection cable failure (no cable / SCC communication failure)	-
		Gray - no protection	-

Software Configuration

For information on how to configure protection for FibeAir 1500P, in *Chapter 5 - Operation*, go to *CeraView for FibeAir 1500P*, and then to *Protection*.

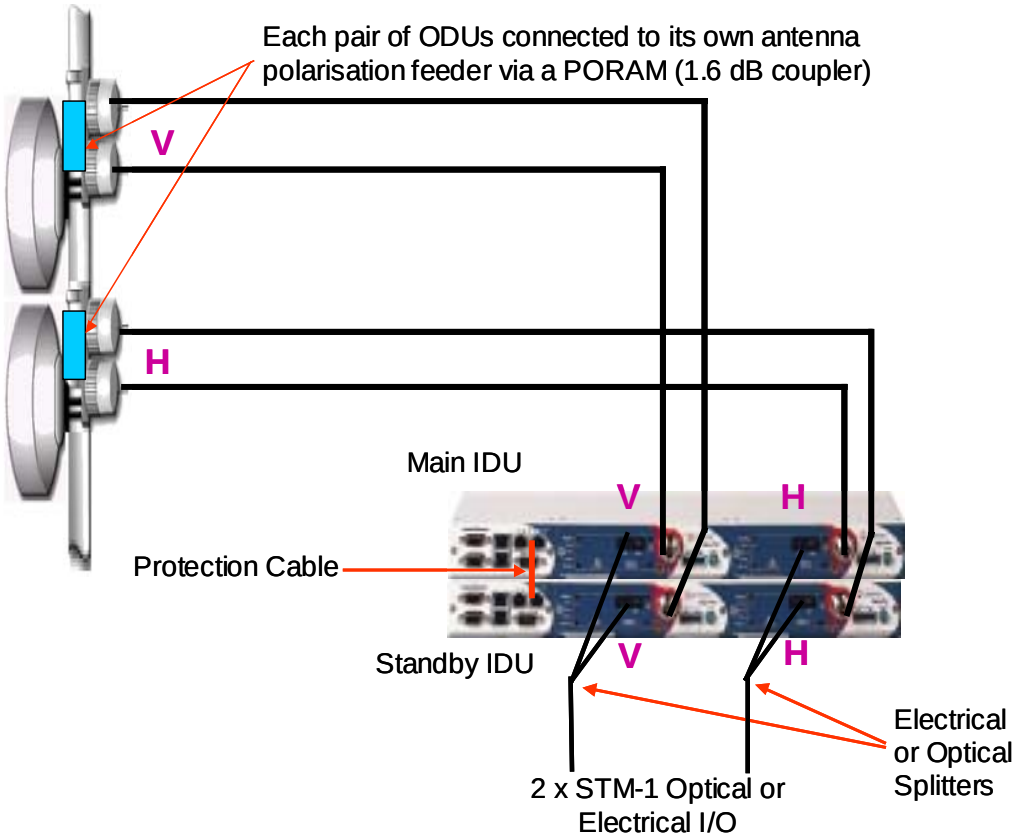
FibeAir 1500P Protected 2+2 Configuration

The FibeAir 1500P 2+2 configuration involves the following components:

- 2 IDUs (main and standby) with 2 IDCs
- For each IDU: 2 x STM-1 optical or electrical I/O with electrical or optical splitters
- 4 ODUs, each pair connected to its own antenna polarisation feeder via a PORAM (Protected ODU Remote Antenna Mount) (1.6 dB coupler)

This protected configuration delivers 311 Mbps over 28 MHz using 128 QAM modulation

The following illustration shows how FibeAir 1500P is set up for a 2+2 XPIC + Hot Standby protected configuration.



Chapter 8
Line Interfaces

General

This chapter provides a description of the FibeAir main channel, wayside channel, and user channel interfaces.

The interfaces are located on the FibeAir IDU front panel.

Main Channel Interfaces

Note: Pictures shown beside each interface specification are for FibeAir 1500. The appearance is slightly different for other FibeAir products (FibeAir 1500P/1500AL), but the specifications are the same.

Main channel interfaces include the following:

Optical

SC/MM/13

Multi Mode 155 Mbps, SC Optical Connector:

Wavelength:	1300 nm
Connector:	SC
Used with:	Multi mode fiber
Protocols supported:	STS-3c, STM-1, OC-3, STS-1, FDDI, TAXI, and Fast Ethernet
Timing mode:	Retimed
Coding method:	4B/5B, NRZ
Optical output to 62.5/125 fiber:	-18 dBm
Receiver sensitivity:	-31 dBm
Maximum input power:	-14 dBm

ST/MM/13

Multi Mode 155 Mbps, ST Optical Connector:

Wavelength:	1300 nm
Connector:	ST
Used with:	Multi mode fiber
Protocols supported:	STS-3c, STM-1, OC-3, STS-1, FDDI, TAXI, and Fast Ethernet
Timing mode:	Retimed
Coding method:	4B/5B, NRZ
Optical output to 62.5/125 fiber:	-18 dBm
Receiver sensitivity:	-31 dBm
Maximum input power:	-14 dBm

SC/SM/13

Single Mode 155 Mbps, SC Optical Connector:

Wavelength:	1300 nm
Connector:	SC
Used with:	Single mode fiber
Protocols supported:	STS-3c, STM-1, OC-3, STS-1, FDDI, TAXI, and Fast Ethernet
Timing mode:	Retimed
Coding method:	4B/5B, NRZ
Maximum output to 9/125 fiber:	-8 dBm
Receiver sensitivity:	-31 dBm
Maximum input power:	-8 dBm

ST/SM/13

Single Mode 155 Mbps, ST Optical Connector:

Wavelength:	1300 nm
Connector:	ST
Used with:	Single mode fiber
Protocols supported:	STS-3c, STM-1, OC-3, STS-1, FDDI, TAXI, and Fast Ethernet
Timing mode:	Retimed
Coding method:	4B/5B, NRZ
Maximum output to 9/125 fiber:	-8 dBm
Receiver sensitivity:	-31 dBm
Maximum input overload:	-8 dBm

Electrical

CX/BNC

Electrical 155 Mbps Connector:

Connector:	BNC
Used with:	Coax cable
Protocols supported:	STS-3c, STM-1, OC-3
Line coding:	CMI
Timing mode:	Retimed
Range calculation:	12.7 dB at 78 MHz according to square root of frequency law 150 m is attainable using RG-59 B/U cables (cable length varies in accordance with type)
Impedance:	75 Ω

DS-3/E3

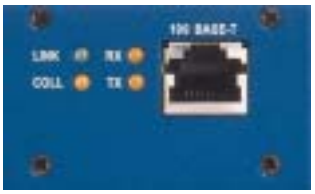
Connector:	BNC
Used with:	Coax cable
Protocols supported:	DS-3, E3
Line coding:	DS-3: B3ZS E3: HDB3
Timing mode:	Retimed
Range calculation:	12.7 dB at 78 MHz according to square root of frequency law 150 m is attainable using RG-59 B/U cables (cable length varies in accordance with type)
Impedance:	75 Ω

FibeAir 1500P

8xE1/T1

Connector:	DB-44
Used with:	Twisted Pair
Protocols supported:	E1/T1
Timing mode:	Retimed
Range:	100 m
Impedance:	120 Ω/100 Ω

Receive Cable		
Twisted Pairs	**RX Signals**	**D-Type 44 Pin No.**
Twisted Pair	R-RING0	2
	R-TIP0	1
Twisted Pair	R-RING1	17
	R-TIP1	16
Twisted Pair	R-RING2	32
	R-TIP2	31
Twisted Pair	R-RING3	4
	R-TIP3	3
Twisted Pair	R-RING4	19
	R-TIP4	18
Twisted Pair	R-RING5	34
	R-TIP5	33
Twisted Pair	R-RING6	5
	R-TIP6	20
Twisted Pair	R-RING7	21
	R-TIP7	35
Shield	CGND (1)	22

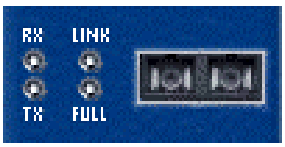


100Base-T (Fast Ethernet, Electrical)

Connector:	Shielded RJ-45
Used with:	UTP Cat 5
Protocols supported:	Fast Ethernet (100Base-T), full duplex
Timing mode:	Retimed
Range:	80 m
Impedance:	100 Ω

100Base-T LED Indicators		
LED	**Color**	**Indication**
LINK	Green	Normal operation
FULL	Yellow	ON - operating at 100 Mbps OFF - operating at 10 Mbps
RX	Yellow	LAN receiving data
TX	Yellow	LAN transmitting data

100Base-T Connector Pinout	
Pin	**Function**
1	Tx+
2	Tx-
3	Rx+
4	
5	
6	Rx-
7	
8	



100BaseFX (Fast Ethernet, Optical)

Wavelength:	1300 nm
Connector:	SC
Used with:	Multi mode fiber
Protocols supported:	Fast Ethernet, FDDI, Fiber Channel, ATM, SONET, SDH
Maximum output to 62.5/125 fiber:	-14 dBm
Receiver sensitivity:	-31 dBm
Maximum input overload:	-11 dBm

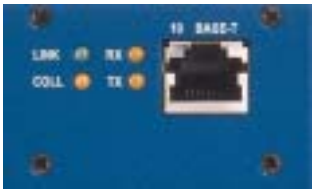
100BaseFX LED Indicators		
LED	**Color**	**Indication**
LINK	Green	Normal operation
FULL	Yellow	ON - operating at 100 Mbps OFF - operating at 10 Mbps
RX	Yellow	LAN receiving data
TX	Yellow	LAN transmitting data

100BaseFX Connector Pinout	
Pin	**Function**
1	Rx Ground
2	Rx Output Data
3	Rx Output Data (inverted)
4	Rx Signal Detect
5	Power Supply, Rx +3.3V to 5V
6	Power Supply, Tx +3.3V to 5V
7	Tx Input Data (inverted)
8	Tx Input Data
9	Tx Ground
S1/S2	Support, not connected

Wayside Channel Interfaces

Note: Pictures shown beside each interface specification are for FibeAir 1500. The appearance is slightly different for other FibeAir products (FibeAir 1500P/1500AL), but the specifications are the same.

The Wayside channel delivers 1.544/2.048 Mbps via the following interfaces:



10Base-T (Ethernet)

Connector:	Shielded RJ-45
Used with:	UTP Cat 5
Protocols supported:	Ethernet (10Base-T), half or full duplex
Timing mode:	Retimed
Range:	100 m
Impedance:	100 Ω

10Base-T LED Indicators		
LED	**Color**	**Indication**
LINK	Green	Normal operation
COLL	Yellow	Collision occurred
RX	Yellow	LAN receiving data
TX	Yellow	LAN transmitting data

10Base-T Connector Pin-Out	
Pin	**Function**
Pin 1	Tx+
Pin 2	Tx-
Pin 3	Rx+
Pin 4	
Pin 5	
Pin 6	Rx-
Pin 7	
Pin 8	

E1/G.703

Option 1:

Connector:	BNC
Used with:	Coax cable
Protocols supported:	E1/G.703
Timing mode:	Retimed
Range calculation:	12.7 dB at 78 MHz according to square root of frequency law
	150 m is attainable when using RG-59 B/U cables (cable length varies in accordance with type)
Impedance	75 Ω

Option 2:

Connector:	Shielded RJ-45
Used with:	UTP Cat 5
Protocols supported:	E1
Timing mode:	Retimed
Range:	100 m
Impedance:	120 Ω

G.703/E1 Connector Pinout	
Pin	**Function**
Pin 1	Tx +
Pin 2	Tx -
Pin 4	Rx +
Pin 5	Rx -

T1

Connector:	RJ-45
Used with:	UTP Cat 5
Impedance Type:	Balanced
Impedance:	100 Ω

T1 Connector Pinout	
Pin	**Function**
Pin 1	Tx +
Pin 2	Tx -
Pin 4	Rx +
Pin 5	Rx -

Order Wire Channel Interface

The Order Wire is used for audio transmission for testing or maintenance purposes.

The specifications for this channel are as follows:

Termination type:	Headset stereo plug
Frequency band (KHz):	0.3-3.4
Input/output impedance (ohms):	600, symmetrical
Input/output backside signal attenuation (dB) out of frequency band:	For 300-600 KHz, not less than 16 For 600-3400 KHz, not less than 20
Input signal level (dBm):	+1
Output signal level (dBm):	+1
Signal level vs frequency (dB):	In accordance with ITU-T G.712
Output noise (input short circuit) (dB):	-60
Perfect idle channel noise (dB):	-63
Single tone interference level (dBm):	Up to -50

User Channel Interface

The User channel delivers 64 Kbps.

The specifications for this channel are as follows:

Protocol:	RS-232
Frequency:	64 KHz
Data to Clock, Rise/Fall Clock Trigger:	Rx data (from radio) transmitted on falling edge Tx data (to radio) sampled on rising edge

Appendix A
PPP/SLIP Driver Installation

Installation for Windows 98

PPP/SLIP driver installation for Windows 98 requires the CeraView installation CD.

The installation procedure involves the following steps:

- Installing the nullmdm file.
- Configuring the TCP dial-up adapter.
- Adding the SLIP protocol to the dial-up adapter (only for SLIP users).
- Configuring PPP

Insert your CeraView CD in the CD drive and perform the procedures described in the following sections.

Installing nullmdm

1. Click **Start** on the desktop, and select **Settings**, **Control Panel**, **Modems**.
2. Click **Add**, and choose **Other** for modem type.
3. Click **Next**.

***Note**: If a modem was not installed in your system, Windows will skip automatically to step 4.*

4. In the Install New Modem window, mark **Don't detect my modem**, and click **Next**.
5. Click **Have Disk**.
6. Click **Browse**, and choose your CD drive.
7. Double-click the **SLIP98** directory.
7. Select **nullmdm.inf**.
8. Click **OK**, and **OK** again. **Direct Connection** appears.
9. Click **Next**.
10. Select **Communication Port (COM1 or COM2)**, and click **Next**.

    The message "Your modem has been set-up successfully" appears.

***Note:** If a modem was not installed in your system, Windows asks for additional area code information.*

11. Click **Finish**, and then **OK**.

Configuring TCP Dial-Up Adapter

1. In the Control Panel window, double-click **Add/Remove Programs**.
2. Click the **Windows Setup** tab, and select **Communications**.
3. Click **Details**, and mark **Dial-up Networking**.
4. Click **OK**, and **OK** again.
5. Windows may automatically restart and ask for the Win98 installation CD. If this does not happen, restart your PC.
6. After the PC restarts, click **Start** on the desktop, and select **Settings**, **Control Panel**, **Network**.
7. In the **Configuration** tab, make sure that the Dial-up Adapter and TCP/IP - Dial-up Adapter components appear in the list. If these components are not in the list, you need to install them manually.
   To install the components, select **Add**, **Adapter**, **Add**, **Manufacturer**, **Microsoft**, **Dial-up Adapter**. Then click **OK**.
8. Select **TCP/IP Dialup adapter**, **Properties**, **Specify an IP address**.
9. Enter the dialer IP address (on the same subnet as the IDU serial address). For example 192.168.0.*xx* when using the default IDU address (where *xx* may be any number between 3 to 255).
10. Enter a Subnet Mask (identical to the IDU subnet mask). For example, 255.255.255.0, when using the default IDU subnet mask,

Note: *The subnet mask must be the same as the Indoor Subnet Mask.*

11. Click **OK**, and **OK** again.
12. Resart the PC.

Adding the SLIP Protocol to the Dial-Up Adapter

1. Click **Start** on the desktop, and select **Programs**, **Windows Explorer**.
2. In the CD, right-click the **Rnaplus.inf** file in the **Slip98** folder, and and select **Install**. If a window appears, click **Yes**.
3. Double-click **My Computer**, **Dial-up Networking**, **Make New Connection**.
4. Enter a connection name (required for reference in the following steps).
5. In the **Select a Device** list, select **Direct Connection**, and click **Next**.
6. Enter the following values:

   Area code - 1
   Telephone number - 1
   Country code - leave as is

7. Click **Next**.

   The following message is displayed: "You have successfully created *connection name*"

8. Click **Finish**.
9. Right-click the **Connection Name** icon, and select **Properties**.
10. In the **Dialing properties** area, unmark **Use country area code** and **Area Code**.

11. In the **Configure** area, select the appropriate maximum speed (the default is 19200 bps).
12. In the **Connection** tab, unmark **Wait for Dial Tone before Dialing**, and set **Cancel the call if not connected within** to 1 sec.
13. In the **Advanced** area, unmark **Use Error Control** and **Use Flow Control**.
14. Click **OK**, and **OK** again.
15. Select the **Server Type** tab.
16. In **Dial-up server**, select the **SLIP Unix/PPP** connection. If it is not listed, return to step 2 and start the installation again.
17. Make sure **TCP/IP** is marked, and unmark all other options.
18. Select **TCP/IP**, and mark **Specify an IP Address**.
19. Enter the IP address. This is the SLIP interface IP address (not LAN address) you entered in step 7 in the section *Configuring the TCP Dial-Up Adapter*.

Note*: Your computer* ***must*** *be connected to the same subnet as the IDU.*

17. Unmark **Use IP Header Compression** and **Use Default Gateway** or **Remote Network**.
18. Click **OK**, and **OK** again.
19. In the **Configure** area, select the appropriate maximum speed (the default is 19200 Bps).
20. In the **Connection** tab, unmark **Wait for Dial Tone before Dialing**, and set **Cancel the call if not connected within** to 1 sec.
21. In the **Advanced** area, unmark **Use Error Control** and **Use Flow Control**.
22. Click **OK**, **OK** again, and **OK** again.

Configuring PPP

1. Configure the dial-up modem by clicking **Start** on the desktop, and selecting **Control Panel**, **Modems**.
2. After you configure the modem, in the **Control Panel**, click **Add/Remove Programs**.
3. In the **Windows Setup** tab, select **Communications**.
4. Click **Details**, and mark **Dial-up Networking**.
5. Select the modem you are using.
6. Click **Configure**, set the baud rate to 38,400, and select the COM port.
7. Click **Connection**, and configure the connection settings as follows:

   Data bits - 8
   Parity - NONE
   Stop bit - 1
8. Click **OK**.
9. Click **Next**, and enter the phone number.
10. Click **Next**, and then **Finish**.

11. In the **Properties** of the dial-up connection that you defined, select **Server Type**.
12. In the **Type of Dial-Up Server** list, select **PPP**.
13. Unmark **Log on to network**, **Require data encryption**, and **Record a log file for this connection**.
14. Unmark **NetBEUI** and **IPX/SPX**.
15. Mark **TCP/IP**.
16. In **TCP/IP settings**, mark **Specify IP Address**, and enter the IP address of the PC dial-up connection.

***Note**: The IP address of the serial line on the IDU should be different, but should have the same subnet.*

17. Click **OK**, and **OK** again.
18. To connect, double-click the desired dial-up connection.

Installation for Windows NT

Before you install the PPP/SLIP driver for Windows NT, make sure that TCP/IP and DIAL UP NETWORKING are installed.

PPP/SLIP driver installation for Windows NT requires the CeraView installation CD.

The installation procedure involves the following steps:

- Installing the nullmdm file.
- Configuring the TCP dial-up adapter.

Insert your CeraView CD in the CD drive and perform the procedures described in the following sections.

Installing nullmdm

1. Click Start on the desktop, and select **Settings**, **Control Panel**, **Modems**.
2. Click **Add**.
3. Mark **Don't detect my modem**.
4. Click **Next**.
5. Click **Have disk**, and in the **CeraViewCD/SLIPNT** folder, select **nullmdm.inf**.
6. Click **OK**.

   The message "NT Direct Connection" appears.
7. Click **Next**.
8. Select **Communication port (COM1 or COM2)**, and click **Next**.

   The message "You will need to restart the system before you can use the modem" appears.
9. Click **Finish**.
10. In the window that appears, select the required port.
11. Select **Properties**, and set the **Maximum speed rate** to the rate of the FibeAir serial port (default is 19200).
12. Select **Connection**, and set the following parameter values:

    Data bits - 8
    Parity - NONE
    Stop bit - 1
13. Mark **Cancel the call if not connected within 1 sec**.
14. In the **Advanced** area, unmark **Use error control** and **Use flow control**.
15. Click **OK**, and **OK** again.
16. Click **Close**.
17. Click **Yes**, and restart the computer.

18. Click **Start** on the desktop, and select **Settings**, **Control Panel**, **Network**, **Services**.
19. Click **Add**.
20. Select **Remote Access Server**.
21. Click **OK**.
22. Click **Continue**.

    RAS drivers are installed., and the Remote Access Setup window appears.
23. Click **Add**.
24. In the window that appears, click **OK**.
25. Click **Network**.
26. Verify that only **TCP/IP dial out protocol** is marked.
27. Click **OK**.
28. Click **Configure**.
29. In **Port Usage**, verify that **DIAL OUT ONLY** is marked.
30. Click **OK**.
31. Click **Continue**.
32. Click **Close**.
33. Click **Yes** to restart your computer.

Configuring the TCP Dial-Up Adapter

1. Double-click **My Computer**, and then **Dial-up Networking**.
2. Enter a new name.
3. In the **Dial using** area, select the required COM.
4. Unmark **Use another port if busy**.
5. Click **Configure**, and set the speed to 19200 bps. Then click **OK**.
6. Select **Server Type**. For **Type of Dial-up server**, select **SLIP INTERNET**.
7. Select **TCP/IP setting**, and enter the IP address. This is the computer SLIP interface IP address (not the Device IP address).

   SLIP interface IP address - 192.168.0.*xx* (where *xx* may be any number between 3 and 30.

   Device IP address - default is 192.114.37.5.
8. Unmark **Force IP header compression**, and mark **Use default gateway or remote network**.
9. Click **OK**, and **OK** again.
10. Click **Close**.
11. Restart the PC.

Installation for Windows 2000

1. Click **Start**, **Setting**, **Network and Dialup**, **Make New Connection**.
2. Click **Next**.
3. Mark **Connect directly to another computer.**
4. Click **Next**.
5. Mark **Guest**.
6. Click **Next**.
7. Select **Communication cable between two computers**.
8. Click **Next**.
9. Select **For all user**.
10. Click **Next**.
11. Type **The connection Name**.
12. Click **Finish**.

Configuring PPP

1. Click **START** , **Setting**, **Network and Dialup**.
2. Select **The connection Name**.
3. In the **General** tab click **Configure**, and set the speed to 38400.
4. Check **Enable Hardware flow control**.
5. Uncheck **Modem Error control**, **Modem Compression**.
6. Select **Network** tab.
7. Select **Type PPP**.
8. Select **Internet protocol** (**TCP/IP**) and click **Properties**.
9. Uncheck all options except TCP/IP.
10. Check **Use the following IP**.
11. Insert **IP Address** (the same subnet as the Indoor).
12. Click **OK**.
13. Click **OK**.

Appendix B
Connector Pin-Outs

- Alarm I/O Connector for FibeAir 1500/1528
- External Alarms Connector for FibeAir 1500P
- Protection Connector for FibeAir 1500P
- 8 x E1/T1 Connector for FibeAir 1500P
- User Channel Cable
- Modem-PPP Cross Cable
- Protected System Cables - FibeAir 1500/1528/1500A/1528A
- 8xDS1 100 ohm & 8xE1 120 ohm Cable
- RJ-45 10-Pin Connector for Hitless Systems
- Wayside Channel Connectors

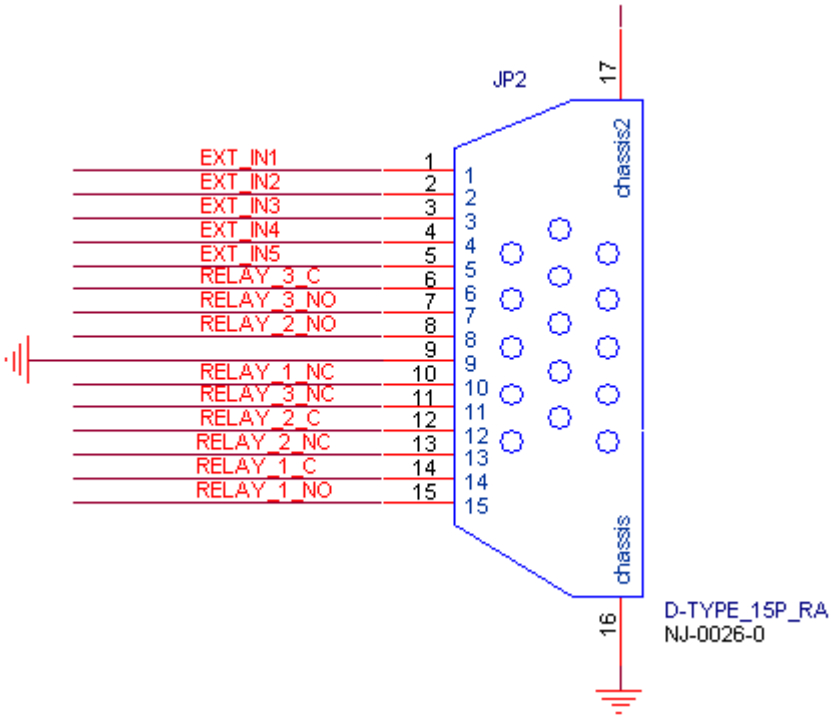
Alarm I/O Connector Pin-Out for FibeAir 1500/1528

Pin #	Signal Name	Signal Description
1	EXT IN1	Input 1 (normally open)
2	EXT IN3	Input 3 (normally open)
3	EXT IN5	Input 5 (normally open)
4	EXT IN7	Input 7 (normally open)
5	RELAY 1NC	Relay Output 1 (normally closed contact)
6	RELAY 1C	Relay Output 1 (common contact)
7	RELAY 2NO	Relay Output 2 (normally open contact)
8	RELAY 3NC	Relay Output 3 (normally closed contact)
9	RELAY 3C	Relay Output 3 (common contact)
10	RELAY 4NO	Relay Output 4 (normally open contact)
11	RELAY 5NC	Relay Output 5 (normally closed contact)
12	RELAY 5C	Relay Output 5 (common contact)
13	GND	Ground
14	EXT IN2	Input 2 (normally open)
15	EXT IN4	Input 4 (normally open)
16	EXT IN6	Input 6 (normally open)
17	EXT IN8	Input 8 (normally open)
18	RELAY 1NO	Relay Output 1 (normally open contact)
19	REALY 2NC	Relay Output 2 (normally closed contact)
20	REALY 2C	Relay Output 2 (common contact)
21	RELAY 3NO	Relay Output 3 (normally open contact)
22	RELAY 4NC	Relay Output 4 (normally closed contact)
23	RELAY 4C	Relay Output 4 (common contact)
24	RELAY 5NO	Relay Output 5 (normally open contact)
25	-	Not Connected

External Alarms Connector Pin-Out for FibeAir 1500P

The External Alarms connector for FibeAir 1500P is a D-type 15 pin connector.

Pin #	Signal Name	I / O	Description
1	EXT_IN_1	Input	External input alarm #1
2	EXT_IN_2	Input	External input alarm # 2
3	EXT_IN_3	Input	External input alarm #3
4	EXT_IN_4	Input	External input alarm #4
5	EXT_IN_5	Input	External input alarm #5
6	Relay 3 C	Output	Relay #3 common pin
7	Relay 3 NO	Output	Relay #3 normally open pin
8	Relay 2 NO	Output	Relay #2 normally open pin
9	GND	GND	GND
10	Relay 1 NC	Output	Relay #1 normally closed pin
11	Relay 3 NC	Output	Relay #3 normally closed pin
12	Relay 2 C	Output	Relay #2 common pin
13	Relay 2 NC	Output	Relay #2 normally closed pin
14	Relay 1 C	Output	Relay #1 common pin
15	Relay 1 NO	Output	Relay #1 normally open pin



Protection Connector Pin-Out for FibeAir 1500P

The Protection connector for FibeAir 1500P is an Rj-45, 8-pin, male type connector.

Pin #		Function
Left	Right	
1	1	GND
2	5	E_SLF_OUT
3	6	IDC TXD
4	7	Cable Echo
5	2	E_MT_IN
6	3	IDC RXD
7	4	NA
8	8	GND

8 x E1/T1 Connector Pin-Out for FibeAir 1500P

The 8 x E1/T1 connector for FibeAir 1500P is a 36-pin connector.

Connector Pin #	Signals	Color	
11	OUT - TIP 1	Brown/Red	TWISTED PAIR
29	OUT - RING 1	Red/Brown	
12	OUT - TIP 2	DarkBlue/Red	TWISTED PAIR
30	OUT - RING 2	Red/DarkBlue	
13	OUT - TIP 3	Blue/Black	TWISTED PAIR
31	OUT - RING 3	Black/Blue	
14	OUT - TIP 4	Orange/Black	TWISTED PAIR
32	OUT - RING 4	Black/Orange	
15	OUT - TIP 5	Green/Black	TWISTED PAIR
33	OUT - RING 5	Black/Green	
16	OUT - TIP 6	Brown/Black	TWISTED PAIR
34	OUT - RING 6	Black/Brown	
17	OUT - TIP 7	DarkBlue/Black	TWISTED PAIR
35	OUT - RING 7	Black/DarkBlue	
18	OUT - TIP 8	Blue/Yellow	TWISTED PAIR
36	OUT - RING 8	Yellow/Blue	
9,10	Shell (1)	-	SHIELD

Connector Pin #	Signals	Color	
1	IN - TIP 1	Blue/White	TWISTED PAIR
19	IN - RING 1	White/Blue	
2	IN - TIP 2	Orange/White	TWISTED PAIR
20	IN - RING 2	White/Orange	
3	IN - TIP 3	Green/White	TWISTED PAIR
21	IN - RING 3	White/Green	
4	IN - TIP 4	Brown/White	TWISTED PAIR
22	IN - RING 4	White/Brown	
5	IN - TIP 5	DarkBlue/White	TWISTED PAIR
23	IN - RING 5	White/DarkBlue	
6	IN - TIP 6	Blue/Red	TWISTED PAIR
24	IN - RING 6	Red/Blue	
7	IN - TIP 7	Orange/Red	TWISTED PAIR
25	IN - RING 7	Red/Orange	
8	IN - TIP 8	Green/Red	TWISTED PAIR
26	IN - RING 8	Red/Green	

Notes:

- Shell is connected to IDU chassis GND.
- The following pins are **not** connected: 27,28.

User Channel Cable Pin-Out

The following table lists the pin-out of the DB9 user channel cable.

User Channel DB9	
1,7,8	Shorted
2	Rx data (from radio) OUT
3	Tx data (to radio) IN
4	Not connected
6	Tx clock OUT
9	Rx clock OUT

Modem-PPP Cross Cable Pin-Outs

This section provides pin-outs for the cross cable installed between the dial-up modem and the FibeAir PPP interface.

DB9 to DB9 Cross Cable

	DB9 Male		DB9 Male	
TX	2	→	2	RX
RX	3	←	3	TX
DTR	4	←	1	DCD
CTS	8	→	7	RTS
RTS	7	←	8	CTS
DCD	1	→	4	DTR
GND	5	→	5	GND

DB9 to DB25 Cross Cable

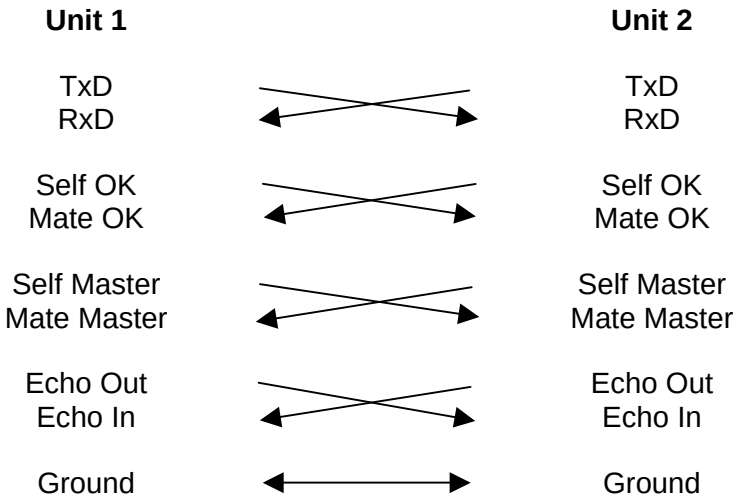
DB9	DB25
1	20
2	2
3	3
4	8
5	7
7	5
8	4

Protected System Cables

FibeAir 1500/1528/1500A/1528A

Protected System Cable Connection

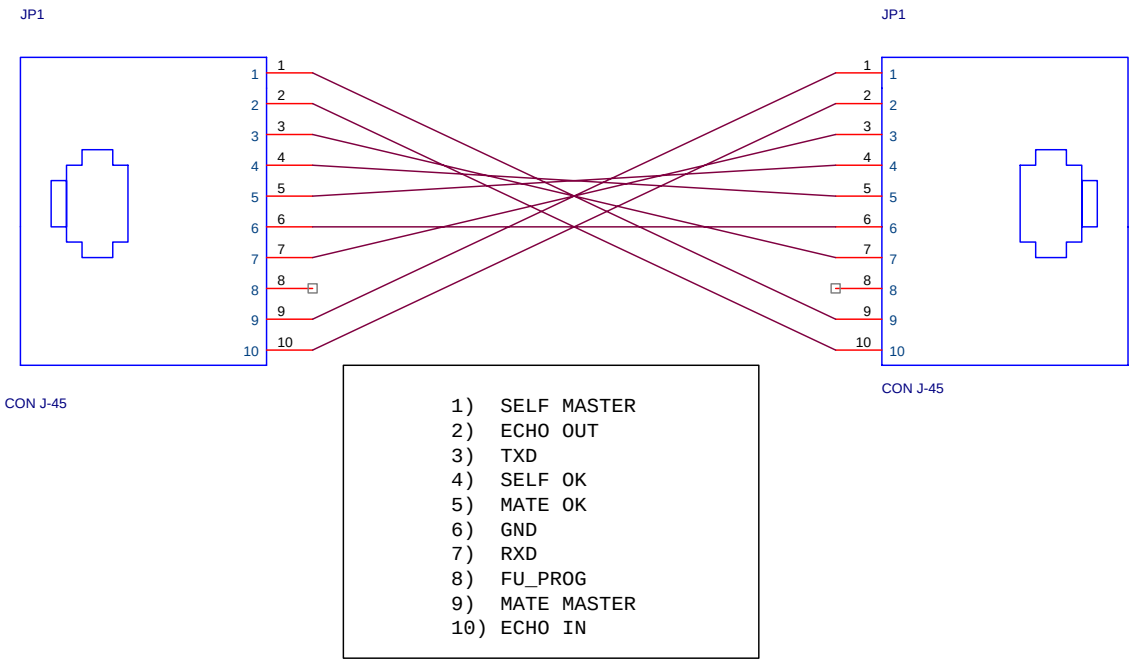
The protected system cable is connected as follows:



RJ-45 Cable Pin-Out for Protected Systems

Use a 20 cm cable with RJ-45 connectors at both ends.

The connectors have the following pin-outs:



8xDS1 100 ohm Impedance & 8xE1 120 ohm Impedance Cable Pin-Out

The DB-44 connectors provide balanced 120 Ohm impedance for E1s, and 100 Ohm balanced impedance for T1s.

It is not recommended to connect the cable-shield to the chassis GND of the **other** side unless there is no chassis GND on the other side.

Twisted Pairs	Signals	D-Type 44 Pin #	Color
Twisted Pair	IN - RING 1	2	Dark Blue/White
	IN - TIP 1	1	White/Dark Blue
Twisted Pair	IN - RING 2	17	Orange/White
	IN - TIP 2	16	White/Orange
Twisted Pair	IN - RING 3	32	White/Green
	IN - TIP 3	31	Green/White
Twisted Pair	IN - RING 4	4	Brown/White
	IN - TIP 4	3	White/Brown
Twisted Pair	IN - RING 5	19	Light Blue/White
	IN - TIP 5	18	White/Light Blue
Twisted Pair	IN - RING 6	34	Dark Blue/Red
	IN - TIP 6	33	Red/Dark Blue
Twisted Pair	IN - RING 7	5	Orange/Red
	IN - TIP 7	20	Red/Orange
Twisted Pair	IN - RING 8	21	Green/Red
	IN - TIP 8	35	Red/Green
Twisted Pair	OUT - RING 1	10	Brown/Red
	OUT - TIP 1	25	Red/Brown
Twisted Pair	OUT - RING 2	26	Light Blue/Red
	OUT - TIP 2	40	Red/Light Blue
Twisted Pair	OUT - RING 3	12	Dark Blue/Black
	OUT - TIP 3	11	Black/Dark Blue
Twisted Pair	OUT - RING 4	28	Orange/Black
	OUT - TIP 4	27	Black/Orange
Twisted Pair	OUT - RING 5	42	Green/Black
	OUT - TIP 5	41	Black/Green
Twisted Pair	OUT - RING 6	14	Brown/Black
	OUT - TIP 6	13	Black/Brown
Twisted Pair	OUT - RING 7	30	Light Blue/Black
	OUT - TIP 7	29	Black/Light Blue
Twisted Pair	OUT - RING 8	44	Dark Blue/Yellow
	OUT - TIP 8	43	Yellow/Dark Blue
Shield	Shell (1)	22,24	

Notes:

1. Shell is connected to IDU chassis GND.
2. The following pins are **not** connected: 6, 7, 8, 9, 15, 23, 36, 37, 38, 39.

RJ-45 10-Pin Connector for Hitless Systems

For hitless systems, the IDUs at each side are connected using an RJ-45 10-pin connector with the following pin-out:

RJ-45 10-Pin Connector Pin-Out	
1	Sync
2	Not Connected
3	Transmit Data +
4	Transmit Data -
5	Receive Data -
6	GND
7	Receive Data +
8	Not Connected
9	Lock
10	Not Connected

Wayside Channel Connector Pin-Outs

This section provides pin-outs for Wayside channel interfaces.

The pinouts provided include:

- Dual 10BaseT (FibeAir 1500P)
- Dual E1/T1 (FibeAir 1500P)
- E1/T1
- 10BaseT
- RS-530
- V.24/RS-232
- X.21

Dual 10BaseT Connector Pin-Out (FibeAir 1500P)

Pin	Function
1	Ch1_Tx+
2	Ch1_Tx-
3	Ch1_Rx+
4	Ch2_Tx+
5	Ch2_Tx-
6	Ch1_Rx-
7	Ch2_Rx+
8	Ch2_Rx-

Dual E1/T1 Connector Pin-Out (FibeAir 1500P)

Pin	Function
1	Ch1_Rx+
2	Ch1_Rx-
3	Ch2_Rx+
4	Ch1_Tx+
5	Ch1_Tx-
6	Ch2_Rx-
7	Ch2_Tx+
8	Ch2_Tx-

E1/T1 Connector Pin-Out

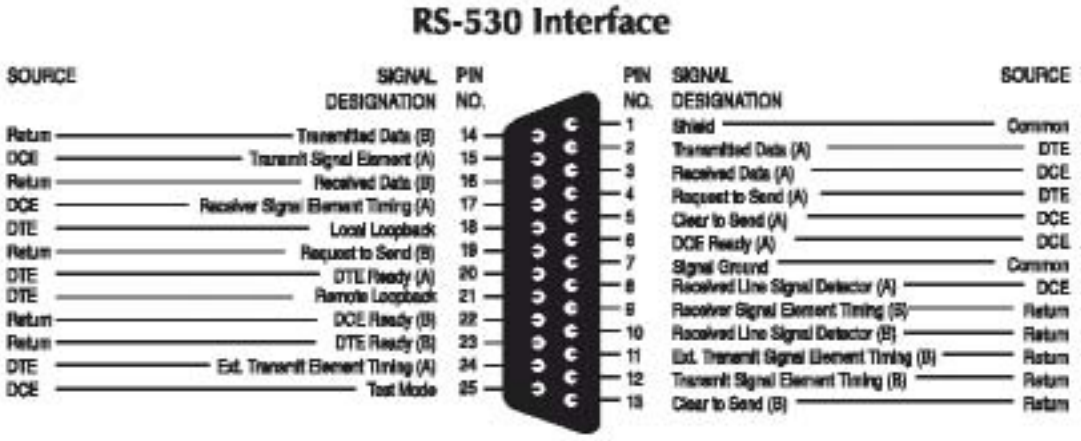
RJ-45 Male Connector Pin (A)	Signal
1	Receive Positive - Primary
2	Receive Negative - Primary
3	Receive Positive - Secondary
4	Transmit Positive- Primary
5	Transmit Negative - Primary
6	Receive Negative - Secondary
7	Transmit Positive - Secondary
8	Transmit Negative - Secondary

10BaseT Connector Pin-Out

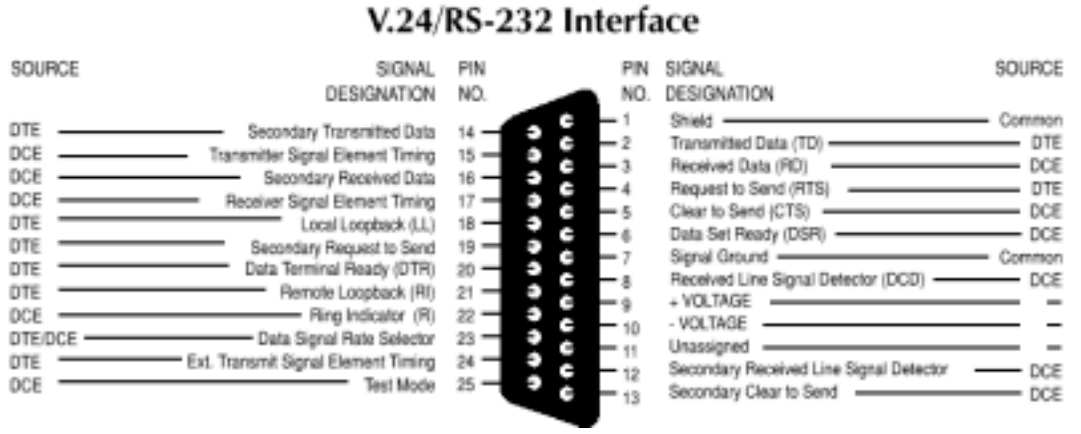
	Signals	Pin #
TWISTED PAIR	Out - Tx Ch2 (Right)	1
		2
TWISTED PAIR	In - Rx Ch2 (Right)	3
		6

	Signals	Pin #
TWISTED PAIR	Out - Ch1 Tx (Left)	4
		5
TWISTED PAIR	In - Ch1 Rx (Left)	7
		8

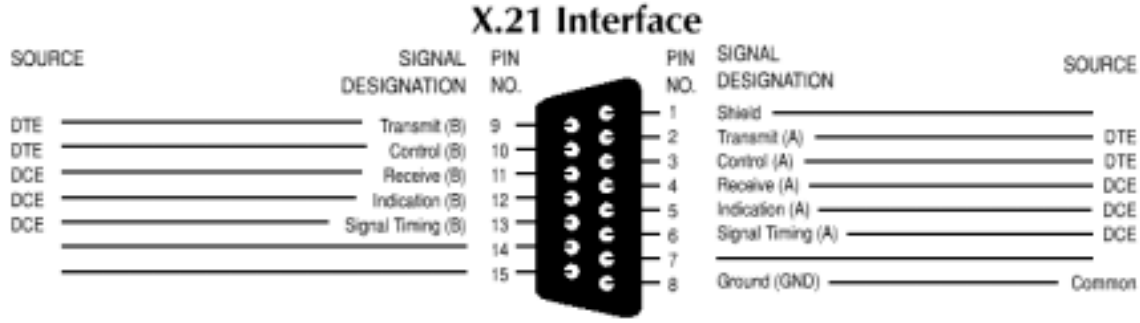
RS-530 Pin-Out


RS-530 Interface
SOURCE
SIGNAL DESIGNATION
PIN NO.
PIN NO.
SIGNAL DESIGNATION
SOURCE
Return — Transmitted Data (B) — 14
DCE — Transmit Signal Element (A) — 15
Return — Received Data (B) — 16
DCE — Receiver Signal Element Timing (A) — 17
DTE — Local Loopback — 18
Return — Request to Send (B) — 19
DTE — DTE Ready (A) — 20
DTE — Remote Loopback — 21
Return — DCE Ready (B) — 22
Return — DTE Ready (B) — 23
DTE — Ext. Transmit Element Timing (A) — 24
DCE — Test Mode — 25
1 — Shield — Common
2 — Transmitted Data (A) — DTE
3 — Received Data (A) — DCE
4 — Request to Send (A) — DTE
5 — Clear to Send (A) — DCE
6 — DCE Ready (A) — DCE
7 — Signal Ground — Common
8 — Received Line Signal Detector (A) — DCE
9 — Receiver Signal Element Timing (B) — Return
10 — Received Line Signal Detector (B) — Return
11 — Ext. Transmit Signal Element Timing (B) — Return
12 — Transmit Signal Element Timing (B) — Return
13 — Clear to Send (B) — Return

V.24/RS-232 Pin-Out


V.24/RS-232 Interface
SOURCE
SIGNAL DESIGNATION
PIN NO.
PIN NO.
SIGNAL DESIGNATION
SOURCE
DTE — Secondary Transmitted Data — 14
DCE — Transmitter Signal Element Timing — 15
DCE — Secondary Received Data — 16
DCE — Receiver Signal Element Timing — 17
DTE — Local Loopback (LL) — 18
DTE — Secondary Request to Send — 19
DTE — Data Terminal Ready (DTR) — 20
DTE — Remote Loopback (RI) — 21
DCE — Ring Indicator (R) — 22
DTE/DCE — Data Signal Rate Selector — 23
DTE — Ext. Transmit Signal Element Timing — 24
DCE — Test Mode — 25
1 — Shield — Common
2 — Transmitted Data (TD) — DTE
3 — Received Data (RD) — DCE
4 — Request to Send (RTS) — DTE
5 — Clear to Send (CTS) — DCE
6 — Data Set Ready (DSR) — DCE
7 — Signal Ground — Common
8 — Received Line Signal Detector (DCD) — DCE
9 — + VOLTAGE — —
10 — - VOLTAGE — —
11 — Unassigned — —
12 — Secondary Received Line Signal Detector — DCE
13 — Secondary Clear to Send — DCE

X.21 Pin-Out



Appendix C
Antenna Information

This appendix provides the following information:

- Instructions for mounting and installing antenna assemblies
- Radiation pattern envelopes

The appendix is provided in a separate booklet.

Please see the separate booklet provided with the FibeAir Family documentation.

Appendix D
Frequency Information

The following tables list local frequencies and channels for the FibeAir system.

Please note that the Width and Separation columns represent MHz values.

FCC Channel Allocations, 16 QAM

Frequency	Width	Separation	Tx Range	Rx Range
18 GHz, Tx Low	80	1560	17700-18150	19260-19710
18 GHz, Tx High	80	1560	19260-19710	17700-18150
23 GHz, High Block, Tx Low	50	1200	21800-22400	23000-23600
23 GHz, High Block, Tx High	50	1200	23000-23600	21800-22400
23 GHz, Low Block, Tx Low	50	1200	21200-21800	22400-23000
23 GHz, Low Block, Tx High	50	1200	22400-23000	21200-21800
24 GHz *	50	150	24075	24225
29 GHz, Tx Low	50	1975	29100-29250	31075-31225
29 GHz, Tx High	50	1975	31075-31225	29100-29250
31 GHz, Tx Low	50	225	31000-31075	31225-31300
31 GHz, Tx High	50	225	31225-31300	31000-31075
38 GHz, Block A High, Tx High	50	700	38050-38400	37350-37700
38 GHz, Block A High, Tx Low	50	700	37350-37700	38050-38400
38 GHz, Block A Low, Tx Low	50	700	37000-37350	37700-38050
38 GHz, Block A Low, Tx High	50	700	37700-38050	37000-37350
38 GHz, Block B Low, Tx Low	50	700	38600-38950	39300-39650
38 GHz, Block B Low, Tx High	50	700	39300-39650	38600-38950
38 GHz, Block B High, Tx Low	50	700	38950-39300	39650-40000
38 GHz, Block B High, Tx High	50	700	39650-40000	38950-39300

* 24 GHz antennas: Radio Wave: HLP1-26, Andrews: VHLP1-240

FCC Channel Allocations, 128 QAM

Frequency	Width	Separation	Tx Range	Rx Range
11 GHz, Tx Low	25	500	10702.5-11417.5	10942.5-11657.5
11 GHz, Tx High	25	490	10942.5-11657.5	10702.5-11417.5
18 GHz, Tx Low	40	1560	17700-18150	19260-19710
18 GHz, Tx High	40	1560	19260-19710	17700-18150
24 GHz, Channel A *	30	150	24062.5	24212.5
24 GHz, Channel B *	30	150	24087.5	24237.5

* 24 GHz antennas: Radio Wave: HLP1-26, Andrews: VHLP1-240